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Original Articles

SOME OBSERVATIONS ON THE TOXICITY OF SYNTHETIC ANTI-MALARIAL REMEDIES

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DURING the last decade a large amount of work has been done on the chemotherapy of malaria; this has resulted in the production of several useful synthetic compounds. Of these plasmochin and atebirin are two well-known and effective drugs which are being extensively used by the profession, and the action of which is on a par with that of the cinchona alkaloids. Most of the anti-malarial remedies in use have their limitations and drawbacks. They may fail to control an attack of fever and more often they may fail to prevent relapses. The problem of the treatment of malaria and its complete cure is so important and urgent in this country that, in order to effect a cure, the medical profession in India have been trying various combinations of anti-malarial drugs. When plasmochin was introduced it was combined with cinchona alkaloids in different ways and extraordinary results were claimed for these combinations. There is no doubt that the two drugs together have certain advantages over administration separately. The main action of cinchona alkaloids is on the asexual forms and they generally control rapidly and effectively the symptoms of the disease. Plasmochin on the other hand acts chiefly on the sexual forms and has greater virtue in preventing the transmission of the disease to others by mosquitoes. The sexual forms are destroyed by this drug in a very short time and prolonged administration is not necessary. These facts have not been fully appreciated by the profession and one frequently meets cases where plasmochin in large doses by itself has been used in the treatment of malaria and to prevent relapses. In combination with cinchona alkaloids it has also been used for prolonged periods for similar purposes. Although a combination of cinchona alkaloids and plasmochin would seem to be ideal inasmuch as the one would destroy the asexual forms of the parasites and the other the sexual forms, there are serious disadvantages in this method of treatment. The cinchona alkaloids can be administered for prolonged periods without producing serious toxic effects, while plasmochin is a potent and toxic drug that does not bear repetition very often without

producing untoward effects, which may be serious.

Since the introduction of atebirin, the belief appears to be gaining ground in some quarters that a combination of the cinchona alkaloids with atebirin may be more effective. Both these drugs act mainly on the asexual forms and such a combination does not appear, so far as our experience goes, to increase their destructive power over these forms of the parasites. One does not increase the action of the other. A combination of plasmochin and atebirin would appear to be more rational and has been frequently used in this country. Many practitioners combine all three drugs and give them for prolonged periods. While the combination of atebirin and plasmochin may be theoretically sound and the most effective in the treatment and eradication of malaria, it appears to be toxic. We have recently seen a number of cases which have led us to form the impression that the toxicity of plasmochin is enhanced by combination with atebirin. While the data at our disposal at present are not sufficient to make a definite statement on this subject, it appears probable that there may be some truth in this opinion. The manufacturers, Messrs. Bayer-Meister Lucius, have also hinted at such a possibility in one of the leaflets issued by them and have deprecated the irrational combination of these drugs. A number of cases of poisoning with various combinations of these drugs have recently come to our notice and we have thought it desirable to record them so as to discourage irrational administration.

Case 1.—T., a European male, was admitted into the Carmichael Hospital for Tropical Diseases on the 12th September, 1933, for cyanosis and pain in the upper part of the chest and neck. Lately, he had several attacks of malaria which were at first treated with quinine. He was then put on plasmochin on the 4th September, 1933. On the first day (i.e., 4th) he had two tablets only. On the 5th, 6th, 7th and 8th he had six tablets each day of 0.02 gramme each and on the 9th two tablets. Cyanosis was first noticed on the 6th September, 1933, and three days later the patient had extreme prostration, headache, backache and epigastric pain. Cyanosis gradually deepened till it reached its maximum on the 9th September. Plasmochin was stopped and the symptoms, with the exception of cyanosis, rapidly disappeared. Physical examination showed no abnormality in the heart, lungs and kidneys. Fresh films of the blood showed well-marked enlargement of the red blood corpuscles and the colour was dichroic (yellow and green). On spectroscopic examination no band of methæmoglobin was seen. There was a trace of albumin in the urine.

Cases of this kind are very commonly met with and we have given one here as an example to show that some practitioners use plasmochin in the routine treatment of malaria in the same way as quinine. They employ fairly large doses, as much as 0.06 gramme daily, which is the maximum dose recommended and which in Indian patients, in our experience, usually produces toxic effects.

Case 2.—B., a European male, was admitted in December 1933 for periodical attacks of malaria since 1927. Shortly before his admission he was given three tablets of atebirin and 0.03 gramme of plasmochin daily for five days. As soon as this course was finished he developed pain under the lower part of the sternum and in the epigastric region and had difficulty in breathing. He also developed cyanosis of the lips and finger nails and suffered from severe palpitation. These symptoms continued with intensity for four or five days and then gradually abated. Clinical examination did not reveal anything abnormal except slight cyanosis of the lips. The blood count showed eosinophilia amounting to 15 per cent.

This patient had 0.03 gramme of plasmochin daily, a dose which usually does not produce toxic effects. In combination with atebirin however the toxicity of the drug appears to have been enhanced.

Case 3.—B., a Bengali doctor, was admitted on the 27th January, 1934, with symptoms of blackwater fever. He had been suffering from repeated attacks of malaria for about two years. Some months before his admission he himself took atebirin and plasmochin—one tablet of each three times daily for five days. Immediately on the completion of the course, that is on the fifth day, he experienced severe pain in the epigastric region which lasted for four or five days and then subsided spontaneously. He passed deep yellow-coloured urine at that time and his body turned yellow. The symptoms however cleared up within a few days. He was keeping fairly well when he suddenly got an attack of blackwater fever and came to our hospital. The patient on admission was anæmic and jaundiced. The spleen was moderately enlarged but no malarial parasites were found in the peripheral blood.

This is another case in which the combination of atebirin with plasmochin produced untoward effects. Whether the administration of these drugs had anything to do with the production of blackwater fever it is difficult to surmise.

Case 4.—D., a European male, was admitted on 2nd February, 1934, for recurrent attacks of malaria in spite of intensive anti-malarial treatment. From June to August 1933 he had taken 10 grains of quinine daily but more (20 to 25 grains daily) during the attacks of fever. In September, he was given two plasmochin pills and 10 grains of quinine daily for 21 days, i.e., 42 pills of plasmochin and 210 grains of quinine in three weeks. After the completion of this course he had a relapse of fever within one week. He started quinine again and continued it in doses of 10 grains daily until towards the end of last December when he had another relapse. This time he had taken a combined course of plasmochin, atebirin and quinine. This course lasted for five days and consisted of three tablets of atebirin, two of plasmochin and 10 grains of quinine daily. He took the full course without any discomfort, but a day after it was completed, i.e., on the seventh day, he was attacked with severe pain in the epigastric region along with incessant vomiting. The symptoms were very severe and intractable and the attending physician had to give him injections of morphine. After treatment for two days the symptoms subsided. He was sent to us for investigation. Physical examination showed slight enlargement of the spleen; the liver was normal. The heart was rapid and the sounds were weak, but no murmurs could be heard; the patient was anæmic but complained of no symptoms. No malarial parasites were found in the peripheral blood. Electrocardiographic examination of the heart showed it to be quite normal. With rest and hæmatinic drugs the patient rapidly improved.

This patient had a prolonged course of plasmochin and quinine without toxic effects but when these drugs were combined with atebirin, although the dose of plasmochin did not exceed 0.02 gramme daily, toxic symptoms supervened. This case also shows the futility of prolonged administration of anti-malarial drugs to prevent relapses.

Case 5.—G., an Anglo-Indian priest, was admitted on the 3rd of February, 1934, with a history of intermittent fever with rigor and vomiting for three days. He contracted malaria in October 1933 and since then he has had periodical attacks almost every fortnight. He took quinine mixture for a short time only. Then he started taking two tablets of atebirin and one of plasmochin every alternate day and this he had done for several months except on the days he had fever. The patient had no untoward symptom because he took the drugs at intervals and in small doses. Physical examination revealed slight enlargement of the spleen and liver. He was very anæmic and run down. Scanty malignant tertian rings were found in the blood.

This case shows the futility of the use of such drugs for an indefinite period for prophylactic purposes.

Case 6.—J., a European missionary lady, was admitted to the hospital on 4th April, 1934. She had an attack of malaria in the beginning of March last and was given atebirin and plasmochin two tablets of each a day alternating with one tablet of each a day. After taking these regularly for a fortnight, she was suddenly attacked with excruciating pain in the epigastrium and precordial region, associated with vomiting and cyanosis. These were at first regarded as symptoms of malaria, and she continued the drugs for another two days. As the symptoms grew worse, the drugs were subsequently stopped. Vomiting persisted for three days, cyanosis persisted for about a week and the pain persisted for eleven days. The patient was very weak, pale and anæmic. There was no enlargement of the spleen and liver. No parasites were found in the blood even by culture.

The symptoms in this patient are undoubtedly those of plasmochin poisoning, although the dose of the drug given was small.

Case 7.—X., a European male, came to the outpatient department in April last to learn the exact method of taking anti-malarial drugs for prophylaxis. He said that, while touring in Assam about a month before, he took atebirin and plasmochin to avoid malarial infection, but 'was nearly killed by them'. On the first day he took two tablets of each; on the third, fourth and fifth days he had three of each. On the sixth day he felt very depressed and had slight pain in the stomach. The pain was very severe on the seventh day and he felt as if he was going to die. It practically disappeared on the eighth day, but next day his whole body turned yellow; this however cleared up in a few days.

This is an example where a patient started the combined use of the two drugs as a prophylactic against malaria on his own initiative. Such cases are frequently met with in India.

Case 8.—G., a young boy of ten years, relative of a member of the staff of the Medical College, was brought to us in April last for persistent slow fever. His illness started with a high remittent type of fever; this persisted for about a fortnight and was followed by low fever for the last three weeks. The boy was in his native village and was being treated by the local doctor. At first he was given quinine (exact dose not ascertained) for four or five days, but as it had no

effect on the temperature he was given atebirin, one tablet thrice daily for four days, without any effect. Then (about the ninth or tenth day of his illness) he was put on plasmochin compound tablets, three times a day. After three days the boy was attacked with severe pain in the liver. This was apparently diagnosed as amoebic hepatitis, plasmochin was omitted and the patient was given an injection of half a grain of emetine hydrochloride by the medical man in charge. Next day he was given another $\frac{1}{2}$ grain of emetine by injection, but the pain in the liver as well as the fever persisted. On the following day he was given 1 grain of emetine hypodermically along with aristochin by mouth. The boy collapsed and his condition became very critical. He however revived with camphor injections and stimulants. The pain gradually subsided within a week but as the fever was persisting he was brought to us for advice. The patient was very pale, anemic and emaciated. The liver was enlarged $\frac{3}{4}$ inch below the costal margin, the spleen was not palpable. The heart was rapid (124 per minute) and the first sound was short and weak. The abdomen was slightly distended and the colon loaded. No malarial parasites were found in the blood. The total leucocyte count was 18,000 per c.mm. and the differential count showed 5 per cent myelocytes; there was a severe degree of anaemia of the microcytic type. As he was unwilling to come into hospital he was advised absolute rest in bed, regulation of the bowels, iron tonic and glucose. After a month the fever subsided, the leucocyte count was practically normal and the boy gradually recovered.

In this case the toxic effects produced by the anti-malarial drugs evidently were mistaken for dysenteric hepatitis and injections of emetine were irrationally given.

Case 9.—G., a Hindu female, was admitted into hospital on the 12th April, 1934, with a history of irregular fever for six months. She had been diagnosed as a case of kala-azar and given thirty-five antimony injections during the last few months, but the fever was not controlled. About a fortnight before her admission she was given tablets of atebirin and plasmochin each thrice daily. She took them for four days, after which she complained of severe palpitation and precordial distress. She was very pale, thin and anemic. The heart was slightly enlarged and there was a systolic bruit. The liver was $\frac{1}{2}$ inch and the spleen $2\frac{1}{2}$ inches below the costal margin.

Electrocardiogram report

P-R interval—0.12 second.

Heart rate—136 per minute, regular.

Voltage of R wave (lead II)—0.80 millivolt.

T wave absent in leads I and II and inverted in lead III.

This report indicates severe myocarditis.

Blood examination showed a leucopenia and a severe macrocytic type of anaemia. No malarial parasites were found. Serum tests were negative. The patient was treated with rest, digifortis, glucose and liver preparations, and gradually recovered.

Case 10.—S., an Anglo-Indian male, was admitted into hospital on the 15th August, 1934, for repeated attacks of malaria, general debility and pain in the right hypochondrium.

During October 1933 he contracted malaria and was given one full course of atebirin after which he turned pale yellow. As the spleen was still enlarged he was advised to take three tablets of plasmochin daily. After two days of this treatment he felt 'queer', but did not think much of it. On the third day he noticed a blue tint in his finger nails. Next morning he went to a place thirty miles away by train and soon after his arrival there he had pain in the liver region, and felt very ill. He took a dose of salts but this did not work well; that night he had fever associated with severe pain in the hepatic region, he vomited twice

and could not pass urine. He thought the whole trouble was due to malaria and continued taking plasmochin. The pain grew worse next day, his body became cyanosed and his general condition was serious. A medical man was called in who found the heart very weak and irregular and the patient in a collapsed condition. Plasmochin was stopped, stimulants were given and the toxic symptoms gradually subsided. The patient was sent to our hospital for treatment.

This case illustrates the development of yellow coloration after atebirin; and pain, vomiting, cyanosis, dysuria and cardiac irregularities after plasmochin. The toxic symptoms here appeared after administration of 0.06 gramme of plasmochin in two days. This is a small dose and it would appear that either the patient was particularly sensitive to the drug or more probably the previous administration of atebirin potentiated the toxic effects of plasmochin. This case also shows the great danger of allowing patients to take these drugs themselves.

Case 11.—L., a Hindu male, was admitted on the 24th August, 1934, for gastritis. In October 1933 he had an attack of malaria. For the first two weeks he had two tablets of atebirin daily, with a tablet of plasmochin half an hour after the atebirin. He was then advised to take one tablet of atebirin and plasmochin every third day for a fortnight; after that he had one tablet of each drug once a week for two weeks; thereafter he had a five-grain tablet of quinine once a week along with 'pyrex' thrice daily for two months. Ever since this treatment he has been getting pain in the stomach, indigestion and vomiting off and on and he came to us on this account. The patient was thoroughly examined and repeated protozoological and bacteriological examination of the stools gave negative results.

This is an example where both plasmochin and atebirin were prescribed at irregular intervals for prolonged periods. The medical adviser had no idea as to how the drugs should be used nor how they acted. A number of patients who have come under the authors' observation show that these drugs, if improperly used even in small doses, produce gastro-intestinal irritation, indigestion and vomiting.

Discussion.—Out of the eleven cases described above ten showed definite toxic manifestations. Of these ten, nine complained of epigastric pain, which is the commonest symptom of plasmochin poisoning. Cases 3, 7 and 10 had yellow staining of the body, which is produced by atebirin. Electrocardiographic tracings of cases 1 to 6 and 10 and 11 showed no definite abnormality, and that of case 9 showed evidence of severe myocarditis. This patient had marked cardiac symptoms and was admitted soon after the symptoms of poisoning appeared.

It has been shown that occasionally plasmochin, even in small doses, is liable to produce gastric pain or cyanosis or both. Sioli (1926) was the first to use plasmochin and he described pain in the liver region and some cyanosis as toxic manifestations of this drug. Fischer and Weise (1927) used plasmochin in the treatment of 172 cases of naturally-acquired

malaria and noted that such symptoms as cyanosis of the fingers, toes, lips and face were not uncommon, while spasmodic gastralgia occurred occasionally, especially when the drug was given on an empty stomach or in large individual doses. Schulemann and Menini (1927) treated 100 cases with plasmochin; it was reported that slight cyanosis of the lips and cardiac arrhythmia were common, while in three cases the cyanosis was of an alarming nature. A relative lymphocytosis and gastralgia were also noticed. The physicians of the United Fruit Company (1927) reported one fatal case in a Negro, the main histological finding being early central necrosis of the liver. Sinton and Bird (1928) had unsatisfactory results with pure plasmochin. In 22 out of 29 patients the course had to be interrupted owing to development of toxic symptoms; four patients failed to complete the course and two became dangerously ill.

Namikawa (1928) reported that in twenty-five cases of malaria treated with plasmochin nine suffered from toxic manifestations. Three benign tertian cases experienced pain in the hepatic region, tachycardia, high fever and cyanosis. Three subtertian cases had black-water-fever-like symptoms on the third to the sixth days, *i.e.*, jaundice, rigor, fever and hæmoglobinuria; the doses given were 0.06 gramme daily. Fischer and Weise found methæmoglobinæmia in ten out of thirteen patients on 0.03 gramme a day and in seven out of seventeen on 0.02 gramme a day.

Amy (1934) recorded some cases of plasmochin poisoning in Quetta. He also pointed out the relationship between such cases and black-water fever. The clinical and pathological characteristics are practically speaking indistinguishable from those of blackwater fever, except that:—

1. Oxyhæmoglobinæmia with oxyhæmoglobinuria is never a result of this form of poisoning, but occurs in blackwater fever.

2. So-called cyanosis is a feature of the poisoning, but it is absent in blackwater fever.

When it is noted that a patient is suffering from oxyhæmoglobinuria and that cyanosis is not present, a diagnosis of blackwater fever is probably correct. On the other hand, when the guide-posts are methæmoglobinuria and cyanosis, plasmochin toxicity suggests itself, to the exclusion of blackwater fever.

Atebrin is a much safer and more potent drug in the treatment of malaria than plasmochin. Green (1932 and 1934) gives an account of 50 cases treated with atebrin. 0.1 gramme per 15 kilogrammes body weight is the optimum daily dose. Two tablets of 0.1 gramme each every morning and one tablet every evening, continued for seven days, were given by him to persons with an average weight of 48 kilogrammes. The drug begins to appear in the urine on the third or fourth day after administration and

continues for more than a week after cessation of treatment. Yellow discoloration of the skin and eyes was noticed. Four patients complained of abdominal pain and two of headache. The drug appeared to have a cumulative effect.

Thonnard-Neumann (1931) treated 60 cases of malaria in Columbia with atebrin alone or combined with plasmochin. The doses employed were atebrin 0.1 gramme tablets thrice daily after food for five consecutive days and when plasmochin was administered it was given in doses of 0.01 gramme per dose. Yellow coloration of the skin which disappeared in two weeks was noticed in several cases. Abdominal pain was noticed only in cases treated with plasmochin in addition. Napier and his co-workers (1932) and Chopra and his co-workers (1933 and 1934) have used atebrin in over 200 cases of malaria in Calcutta without producing any serious toxic effects.

The toxic effects in the above-mentioned cases were chiefly produced by plasmochin and the simultaneous use of atebrin may have played a part later by increasing the toxicity of plasmochin or by making the patient sensitive to the latter drug.

Information regarding the causation of various symptoms is scanty. Several hypotheses have been advanced but none offers a satisfactory explanation. It has been suggested that symptoms are connected with a progressive accumulation of the drug or its by-products in one part, or system of the body. A little more information on this point has been obtained by Thonnard-Neumann (1931) and x-ray examination of the bowels (after combined atebrin and plasmochin) showed a 'hyper-peristaltic stomach', together with 'spastic contractions of the small and large bowel'. The effects may have been due either to atebrin or plasmochin acting separately, or possibly to some new product formed by the interaction of the two drugs in the body.

It should also be remembered, however, that some individuals are undoubtedly more sensitive to the drug than others. Toxic symptoms appear early and are generally more marked in those patients who are very weak, anæmic and run down. It would also appear that the toxicity of plasmochin is enhanced when combined with atebrin, at any rate in some of the cases, but this point requires further study.

Summary and conclusions

A number of instances of the toxic effects produced by the synthetic anti-malarial remedies have been given so as to impress on the profession that care should be exercised in the use of these drugs.

The main action of plasmochin is on the sexual forms and therefore it has neither very marked curative action in this disease nor does it prevent relapses.

The sexual parasites are destroyed by small doses after a few days' administration and therefore the main function of the drug is to prevent dissemination of the disease by mosquitoes.

Plasmochin is a toxic drug and does not bear repetition too often without producing serious toxic effects.

It has been shown that 0.02 grammes of plasmochin daily for a two or at most three-days' course causes disappearance of the crescents in the peripheral blood in cases of Indian strains of malaria and prolonged use is unnecessary and dangerous.

Neither plasmochin nor atebtrin should be used for prolonged periods for prophylactic purposes.

Patients should not be allowed to use these drugs except under direct medical supervision.

There is some evidence to show that combining atebtrin with plasmochin increases the toxicity of the latter.

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ATEBRIN IN THE TREATMENT OF MALARIA IN RAILWAY EMPLOYEES

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From the time of the discovery of cinchona up to 1926 when Professor Schulemann found a more effective anti-malarial remedy in a synthetic compound known as plasmochin, the only drugs that had been used effectively in the treatment of malarial fever were cinchona bark and the alkaloids obtained from it, particularly quinine.

Plasmochin had little therapeutic value in the treatment of subtertian malaria, having no action on the schizonts of *P. falciparum*, but it possessed the unique property of destroying the crescents or sexual forms. This drug had a certain value in the cure of benign tertian and quartan malaria and, to augment its curative effect, it became the practice to combine quinine with plasmochin in treating all types of malaria. Plasmochin, however, required medical supervision for its administration as it was found to be toxic and likely to give rise to severe untoward symptoms.

The introduction of atebtrin in 1929 by Schulemann and his collaborators marked a definite advance on the old and tried remedy, quinine, the newer preparation plasmochin and on the combined quinine and plasmochin treatment.

The treatment by atebtrin has been reported on by many workers to be short, simple, and effective. Such a treatment appeared to us to be most suitable for cases amongst the staff on a railway where the 'sick-man-days' lost to railway administrations due to malaria is such a burden, both financially and by loss of efficiency.

We are herein summarizing the results of a study of the effects of treatment of malaria by atebtrin and plasmochin on over 300 patients living under conditions that generally appertain to all Indian railways. In nearly all cases the patients were treated as outpatients.

The Eastern Bengal Railway traverses parts of Bengal where malaria is endemic, the cases ranging from the very mild to fulminating ones attended with fatal results. Our patients may therefore be taken to represent infection with many strains of parasites prevalent in Bengal.

The studies in this connection were undertaken mainly to determine:—

- (1) the best method of administration of the drug;
- (2) its effect on the parasites—sexual and asexual;
- (3) its effect on the temperature and other symptoms in malaria;

(4) its effect on the splenic enlargement and relapses;

(5) any untoward symptoms caused by its administration.

Grouping.—The patients were placed in the following three groups:—

- (1) Persons with parasites in the blood.
- (2) Persons with enlarged spleens and previous history of malaria, but with no parasites in the blood.
- (3) Persons with neither enlarged spleen nor parasites, but with definite previous history of malaria.

Administration of treatment.—Each group was further divided in two batches:—

(A) One batch was given atebirin only for the first five days and then plasmochin for the next five days; thus a period of ten days was required for the full course of treatment;

(B) the other batch was given atebirin and plasmochin together during the first five days; thus the period of treatment was reduced to only five days.

The dosage of these drugs was as follows:—

A. For those given atebirin for the first five days and plasmochin for the next five days.

Adults.—One tablet of atebirin ($1\frac{1}{2}$ grains) three times a day for the first five days, i.e., a daily dose of $4\frac{1}{2}$ grains.

One tablet of plasmochin ($1/6$ th grain) three times daily for the next five days, i.e., a daily dose of $\frac{1}{2}$ grain of plasmochin per day.

Children from 1 to 5 years.—One tablet of atebirin ($1\frac{1}{2}$ grains) in three divided doses per day for the first five days.

One tablet of plasmochin ($1/6$ th grain) in three divided doses per day for the next five days.

Children from 6 to 12 years.—One tablet of atebirin ($1\frac{1}{2}$ grains) twice daily per day for the first five days, making a total quantity of three grains of atebirin per day.

One tablet of plasmochin ($1/6$ th grain) twice daily per day making a total of $1/3$ rd grain of plasmochin per day.

B. For those given atebirin and plasmochin together during the five-day course.

Adults.—One tablet of atebirin ($1\frac{1}{2}$ grains) and one tablet of plasmochin ($1/6$ th grain) in the morning, a similar dose being repeated in the afternoon and evening. Thus each adult had three tablets of atebirin and three tablets of plasmochin per day, i.e., a total quantity of $4\frac{1}{2}$ grains of atebirin and $\frac{1}{2}$ grain of plasmochin.

Children from 1 to 5 years.—One-third of an atebirin tablet, i.e., $\frac{1}{2}$ grain, and one-third of a plasmochin tablet, i.e., $1/18$ th grain, in the morning, a similar dose being repeated in the afternoon and evening. Each child in this group therefore received $1\frac{1}{2}$ grains of atebirin and $1/6$ th grain of plasmochin per day.

Children from 6 to 12 years.—One tablet of atebirin ($1\frac{1}{2}$ grains) and one tablet of plasmochin ($1/6$ th grain) in the morning, a similar dose being repeated in the evening. Thus each child in this group received 3 grains of atebirin and $1/3$ rd grain of plasmochin per day.

Children over 12 years were given the same doses as adults. Children under 1 year were not given any atebirin or plasmochin and are not included in this report.

Methods adopted.—Atebrin was given by the mouth after food either in tablet or powder form. As it leaves no lasting bitter taste in the mouth, it is readily taken by children.

The observations recorded covered a period of eighteen months from January 1933 to June 1934 and include a total of 334 patients. The patients taken up for treatment underwent a thorough physical examination, the peripheral blood was examined and the number of parasites both sexual and asexual per cubic centimetre was determined. Careful daily parasite counts were made in one series of 17 cases. In the rest, the blood was examined before treatment, on the fourth day of treatment and after treatment. A special dispenser was deputed to see that the prescribed doses were swallowed in his presence and in no case were the drugs given to the patients to be taken in the absence of the dispenser. No other drug was given except a purgative, when necessary, and no restrictions regarding diet were observed.

As all the patients were railway employees or their dependents, living in the railway colonies, they were under close observation after the completion of the course of treatment and in a large number of cases it was possible to make fortnightly examinations of the blood after the end of treatment. Though plasmochin has its special value in destroying the gametocytes of subtertian malaria, we made it a rule to give both atebirin and plasmochin in all forms of malaria for reasons to be explained later.

Results of treatment.—In group I, there were 143 cases with positive parasite findings—118 subtertian, 14 quartan, 10 benign tertian, and one mixed subtertian and quartan; out of these, 114 were given atebirin and plasmochin separately (group I-A), while 29 others received atebirin and plasmochin together (group I-B).

A study of this group shows that cases of all three forms of malaria responded equally well. The temperature usually came down on the second or third day of treatment, and on the fifth day there was complete disappearance of the parasites from the peripheral blood. After the fourth day of administration of atebirin, rigors were seldom observed. Atebrin caused a gradual reduction in the number of asexual parasites though in some cases (in 4 out of 17 cases in which daily counts were made—of group I-A) the asexual forms increased on the second or third day before finally disappearing on the fifth day. Very little difference was noted in the temperature records whether the case was treated with atebirin alone, or in conjunction with plasmochin, as the temperature came down within 48 to 56 hours in every case, showing thereby that atebirin adversely affects the asexual forms of all species of malaria parasite equally well.

On the sexual forms, atebirin has a slower action. Gametocytes of benign tertian and quartan disappear much more quickly than subtertian, while those of subtertian persisted even on the fifth day (in three cases of group

I-A). In some cases of subtertian, the gametocytes had however disappeared on the second or third day. It is therefore possible that atebirin may have some delayed action on the gametocytes of subtertian as they were noted to disappear by the eighth day in the three cases in which they had persisted up to the fifth.

Of the 66 chronic cases with enlarged spleen and without parasites in the blood (group II), there was rapid and perceptible reduction in the size of the spleen in 56 cases. Most of the spleens of two and three fingers were reduced to practically normal size. In two cases of group II-A which had six- and five-finger spleens, respectively, these were reduced to normal size, but the decrease in size was more gradual in long-standing cases and the spleen did not decrease to its normal size. The remaining ten cases in this series of 66 showed no reduction in the spleen size.

In chronic cases, the action on the temperature curve is less marked than in acute ones.

Group III consists of cases diagnosed only clinically, i.e., there were neither parasites in the blood nor enlargement of the spleen, but there was a definite history of clinical malaria. These responded equally well to the treatment, the only noticeable difference being that in some cases the temperature persisted for a longer time than is usual in cases with positive parasite findings. It is probable that several of these clinical cases are chronic in nature, and as such the effect on the temperature was less marked than in acute cases with parasites.

Relapses.—On the Eastern Bengal Railway a relapse is considered as a return of febrile symptoms with parasites in the blood within a period of 12 months since the attack for which the treatment was undertaken. Although the figures, as far as the relapse rate is concerned, are obtained from the staffs of stations under malaria control, the control is not such as to absolutely exclude reinfection. Therefore the relapse rate figure is probably too high.

Of the 334 cases, 50 have 'relapsed' giving a 'relapse' rate of 14.9 per cent. Two cases in group I-A and one in group I-B relapsed within a month of the completion of treatment. All the patients who relapsed are from some of the most notoriously malarious places in Bengal, viz, the Dooars and Terai of Bengal. Some of the cases occurred in 'running' staffs, i.e., staffs not confined to one station, but engaged on travelling duties.

Though it is difficult to exclude the possibility of fresh infection, it should be noted, however, that the three cases of relapse cited above occurred within a month of the completion of treatment. Even granting that they may not be real relapses but fresh infections, such infection must have taken place before the atebirin had been fully excreted from the body, as the

drug can be detected in the urine up to 20 days or even longer. The data in our possession are yet too meagre at present to pronounce any definite opinion on the question of relapses after atebirin. We have this year instituted a systematic treatment with these drugs in the Calcutta Medical District of the Eastern Bengal Railway and are collecting statistics that might enable us to understand this aspect better.

It so happened that in November 1933 there was an accidental shortage of plasmochin and 22 cases (20 malignant tertian and 2 benign tertian not included in the series here reported) were treated with atebirin only. Curiously enough the two benign tertian cases have relapsed although none of the benign tertian cases of the 143 patients treated with atebirin in conjunction with plasmochin (group A) have relapsed so far. This suggests that even in benign tertian cases atebirin and plasmochin administration is better than giving atebirin alone. It is anticipated that the relapse rate will be still less with the two drugs than with one alone.

It may not be out of place to point out that although one can rely on a trained medical subordinate to spot a malarial parasite, such reliance cannot always be placed on his ability to spot the species of the parasite. On a railway system, patients are scattered, being at different places, and the identification of malarial parasites has perforce to be made by medical subordinates of varying grades of ability. In view of the fact that the inclusion or non-inclusion of plasmochin in the treatment depends on the correct identification of the subtertian parasites, and that there is a great possibility of errors in this direction, and in view of the probable decreased relapse rate in benign tertian cases if plasmochin is also given, there would seem to be sufficient justification for treating all cases of malaria with atebirin in conjunction with plasmochin, on railway systems at any rate.

Untoward and toxic symptoms.—Such symptoms when they occurred consisted of varying degrees of gastric pain, vomiting and yellow pigmentation of the skin. Of the 334 patients treated, 258 received atebirin and plasmochin separately, i.e., atebirin for the first five days followed by plasmochin for the next five days. Of these 258, fifteen cases exhibited the following symptoms:—

Five complained of slight pigmentation of skin.

Six complained of slight gastric pain.

One complained of moderately severe gastric pain.

Three complained of severe gastric pain and yellow pigmentation of skin.

None of these symptoms was of any consequence. The severe gastric pain complained of disappeared after a liberal dose of sodium bicarbonate with tincture of hyoscyamus. On the percentage basis it may thus be stated that 5.8 per cent of those treated with atebirin and

plasmochin separately exhibited untoward or toxic symptoms. The remaining 76 cases received atebirin and plasmochin together during the five days' course, i.e., atebirin and plasmochin were swallowed at the same time according to the dosage. In this series 16 persons, or 21.05 per cent, exhibited untoward symptoms. Of these one had extremely severe gastric pain, vomiting and slight collapse, while the others complained of gastric pain of moderate to slight intensity and pigmentation of the skin.

Pregnant women bear the drugs well. Persons exhibiting a high degree of idiosyncrasy to quinine can take these drugs without any discomfort. One patient could not tolerate a grain of quinine and was a constant sufferer from malaria; she was given atebirin and plasmochin together for five days more than a year ago, and ever since has been keeping well.

Cost of treatment.—The actual cost of one course of atebirin and plasmochin for an adult is Re. 1-11-8. As against this, the cost of one course of quinine treatment for three weeks is Re. 1-11-4½; but from the view-point of the saving in hospital costs, and reduction in the time lost by the patient, it is certainly a cheaper method of treatment than quinine.

Summary and conclusions

1. Atebrin and plasmochin are effective in the treatment of malaria due to all strains of plasmodium in Bengal.

2. It is uncommon to find a temperature above 99°F. after 48 hours' treatment.

3. With the exception of subtertian gametocytes it is rare to find malarial parasites in the blood after the third day of treatment.

4. In subtertian malaria plasmochin also should be given owing to its specific action on the subtertian gametocytes.

5. In the absence of absolute certainty regarding the species of parasite, it is beneficial to use atebirin with plasmochin in all forms of malaria.

6. Atebrin produces a rapid reduction in the size of the spleen.

7. People exhibiting idiosyncrasy to quinine tolerate atebirin with plasmochin well.

8. Atebrin given alone occasionally produces certain untoward symptoms which are seldom serious.

9. Atebrin and plasmochin given together cause untoward symptoms in a larger percentage of cases and the symptoms are more severe.

10. It is safer to give atebirin for the first five days followed by plasmochin for the next five days.

11. The cost of treatment is on the whole less than treatment with quinine.

(Continued at foot of next column)

NOTES ON AN EXPERIMENT ON THE PROPHYLACTIC AND CURATIVE VALUE OF ATEBRIN AND PLASMOCHIN THERAPY IN A TEA GARDEN IN ASSAM*

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Introduction.—Malaria is a serious problem in all industrial concerns in India, especially in the tea industry. It is responsible for the loss of many working days, especially at a time when a tea garden can hardly afford it, not to speak of children's deaths, anæmia, loss of vitality and weakening of the power of resistance to other diseases. The necessity of malaria control is appreciated by all, but it is a very difficult problem to face. Moreover it is probably not realized by many that in order to form an accurate opinion regarding the practicability of permanent malaria control in any given locality, mature judgment, wide experience and a thorough knowledge of anti-malarial measures are required. Also the ability of the authorities concerned to provide large funds for it and the cost of maintaining it subsequent to its adoption have to be considered. Hence in many tea estates temporary anti-malarial measures are adopted of which drug prophylaxis is one. For about the last seven years plasmochin, and for about two years atebirin, have gained prominence in this respect and many papers have appeared as to the value of these drugs from various parts of the world with such varying results that we decided to make an experiment ourselves and form an opinion of our own as to the efficacy of these drugs as prophylactic and therapeutic agents in this locality. Bokpara Tea Estate of the Budla Beta Tea Company, Limited, was selected for this experiment and Colonel H. C. Garbett, C.I.E., V.D., superintendent of the company, kindly obtained the sanction of Rs. 1,000 for this purpose.

* Read at a meeting of the Assam Frontier and Budla Beta Medical Society held on 11th October, 1934.

(Continued from previous column)

The treatment of malaria with atebirin and plasmochin is a distinct advance. The treatment is simple, short and economical. The consistent use of this drug should effect a considerable reduction in the number of malaria cases and the consequent loss of working days due to this disease on Indian railways.

Description of the 'coolie line' where the experiment was conducted.—The experiment was carried out in one 'line' only, with a total population of 234, of whom 84 were men, 75 women and 75 children. The population was a stable one and there was no immigration of new labour into this line, not only during the season of experiment but for the last four years. There are 75 houses (of which 53 are 'pucca') in 10 rows running behind each other parallel to the 'pathar'—at distances from the 'pathar' varying from 25 yards, the nearest row, to about 200 yards, the row furthest away. There is a gradual slope from the houses down to the *bhil* which lies about 20 feet below the highest row and 10 feet below the lowest row. A sluggish stream flows into this *bhil* at the eastern corner of the line. This line is situated in the centre of the garden quite adjacent to the hospital but separated from two other neighbouring lines by a distance of quarter of a mile and one-eighth mile respectively. It has always been highly malarious and generally unhealthy. The inhabitants are mainly Oorials from Cuttack—a people notoriously liable to ills of all sorts and with a low resistance.

Methods adopted.—The experiment with atebirin and plasmochin was undertaken in 1933 from July to the end of the year with the following objects:—

(1) To determine the value of these drugs as a prophylactic in the method and doses given.

(2) To estimate their value as curative agents.

(3) To ascertain the toxic effects, if any, of these drugs arising out of the method adopted.

It was obvious that in dealing with a labour force on a tea estate it was quite impossible to administer any prophylactic drug three times a day; the administrative difficulties were insuperable and the dislocation of labour entailed by such an undertaking prohibitive. Besides it seemed to be inviting trouble to give atebirin three times a day quite irrespective of time and relationship to food, weather and work, even if such a thing were possible with the limited staff available. We were strengthened in this opinion by alarming reports from a tea estate on which such an experiment was attempted and had to be perforce abandoned quickly owing to the apparent alarming ill effects of atebirin and plasmochin on the labour. This was to be expected with atebirin given somewhat indiscriminately as noted above. Consequently it was decided to administer atebirin in one dose daily in the evening after work was over at the time of the taking of the evening meal. This was possible on this estate as the line on which the experiment was carried out was contiguous to the hospital. It was felt that if atebirin was to be given to a labour force as a prophylactic, unless it could be given in one dose with food, it was doomed to failure

owing not only to untoward effects* of the drug, but also to the dislocation of labour and the lack of time of the medical staff available. It consequently had to be determined in what dosage the drug could be given in one dose to be of any prophylactic value and at the same time to avoid accidents. The writers determined on the following single doses of atebirin and the following course:—

Adult men and women (those over 8 years were counted as adults) were given 2 tablets, or 3 grains in one dose per day after food in the evening.

Children between 4 to 8 years were given 2 grains in one dose per day after food in the evening.

Children between 1 to 4 years were given 1 grain in one dose per day after food in the evening.

Children under 1 year were given half grain in one dose per day after food in the evening. (The great majority of these children were breast-fed).

Those old enough to swallow were given the drug in tablet form; those too young in liquid form or rather in suspension in water. The administration was carried out by the junior writer and his staff in the evening between 6 and 7 o'clock. We can guarantee that the administration of these drugs was carried out properly in the manner indicated. It was decided to adopt the following procedure:—

Beginning on 17th July atebirin was given to the labour of the selected line to the number of 234 for five days, once daily in the evening after food in the doses already outlined. This was followed by plasmochin for five days, once daily in the evening after food in the following doses—

Adults were given one-third grain in one dose per day after food in the evening.

Children between 4 to 8 years were given a quarter grain in one dose per day.

Children between 1 to 4 years were given one-sixth grain in one dose per day.

Children under 1 year were given one-twelfth grain in one dose per day.

[Plasmochin tablets are available in two forms, viz, (i) .01 gramme or one-sixth grain and (ii) .02 gramme or one-third grain. The latter is grooved in the middle and can be easily divided into two equal parts.]

This was followed by plasmochin in the above method and dosage given twice a week till the end of November. In addition a second course of atebirin was given to the children only, for five days in the doses already outlined, beginning on 28th August and ending on 1st September.

The line population was seen by the junior writer every night till the end of September to detect any malarial cases or relapses and also

* We think it only fair to state that at the time when this experiment was begun the reported ill effects of atebirin were in all probability not due to atebirin at all, as such, but to its combination with plasmochin or the administration of it immediately following on atebirin before the latter is eliminated from the system. Our most recent experience inclines us to the opinion that the toxic effects of atebirin alone in the usual doses are negligible except for the yellow discoloration that shows itself occasionally.

to find out if there were any ill effects of the drugs. Blood slides of febrile cases (thick and thin films combined, stained by Giemsa's method) were examined for malaria parasites by the junior writer, and also some slides of children taken at random during the afebrile period. This daily work was continued by his successor Dr. D. C. Sen during October, November and December. All cases of malaria either primary after the first taking of these drugs or after a relapse were admitted to the hospital and given a five-day course of atabrin followed by a five-day course of plasmochin in the dosage and method shown in table I.

the longest period being 103 days and the shortest eight days. Cent per cent of this series relapsed; two of them (both Indians) relapsed twice.

It will be noted from table II that relapse rates vary according to age groups from 153.3 per cent in those below two years to 4.31 per cent in those over 15 years, showing the absence of resistance in the very young and gradual development of relative immunity in later age groups. The total average relapse rate for all ages was 21.36 per cent. The total number of relapses was 50 out of 234 for the five months, August to December inclusive. It may be

TABLE I

Age	ATEBRIN		PLASMOCHIN	
	Duration of treatment	Dose	Duration of treatment	Dose
Adults	5 days	1½ grs. thrice daily after food.	5 days	½ gr. thrice daily after food.
Children between 4—8 years.	Do.	1½ grs. twice daily after food.	Do.	½ gr. twice daily after food.
Children between 1—4 years.	Do.	1½ grs. once daily after food	Do.	½ gr. once daily after food.
Children under 1 year	Do.	¼ gr. once daily after breast feed.	Do.	¼ gr. once daily after breast feed.

Table II gives the relapse* rate by ages.

On an average the relapse took place 41.3 days after the completion of the course of atabrin, the longest period being 116 days and the shortest one day.

contrasted with the average number of relapses (on the same population during the same months) for the preceding five years which was 40.2. At first sight it occurs to one that atabrin and plasmochin had a provocative effect on

TABLE II
Showing relapses by ages

	Below 2 years	Between 2—4 years	Between 4—6 years	Between 6—8 years	Between 8—15 years	Over 15 years	TOTAL
Number treated in the line.	15	29	20	11	20	139	234
One relapse .. .	11	8	3	3	4	6	35
Two relapses .. .	8	2	..	1	..	..	11
Three relapses .. .	3	..	..	..	..	..	3
Four relapses .. .	1	..	..	..	..	..	1
Total relapses ..	23	10	3	4	4	6	50
Percentages	153.3	34.48	15	36.36	20	4.31	21.36

In another series of 12 private patients (all adults)—6 Europeans and 6 higher-class Indians—treated by the senior writer, relapse took place after 38.7 days counting from initial pyrexia,

* All malaria cases occurring after the administration of the drugs are counted as relapse owing to the intensity of the infection in this line especially in little children from the age of two months onwards.

the relapse rate. But it may be pointed out that during this experiment we always kept a very vigilant eye on this line and all cases of malaria were detected and admitted into hospital without exception, but in other years doubtless many cases, especially very young children, escaped notice and were left untreated in the line. Allowance must be made for this.

But at the same time it is evident that the treatment had no marked controlling influence on the relapse rate in children.

It will not be out of place to mention in this connection that between June and December 1932 inclusive, the junior writer carried out an experiment in the same line to test the prophylactic value of cinchona febrifuge in children alone, who are the main reservoirs of infection. He divided the line into two halves in a crosswise manner and daily gave cinchona excepting Sundays to 34 children of half the line. Forty-five children of the other half were left as controls without any treatment. He found the relapse rate in the former group as 64.70 per cent and in the latter group as 66.66 per cent. As the number is small no definite conclusion can be made but it suggests the failure of cinchona as a prophylactic in children. It is however possible that some of the relapses might be reinfections.

This table brings out clearly that as the treatment continued (i) relapses due to malignant tertian parasites progressively diminished; (ii) there was no progressive reduction in relapses due to benign tertian parasites.

Table V shows the monthly incidence of malarial infection in apparently healthy children whose blood slides were taken at random.

This table shows that as the treatment continued (i) malignant tertian infection was reduced, (ii) benign tertian infection persisted, and (iii) total infection gradually diminished.

Therapeutic results of atebirin and plasmochin treatment.—It has already been mentioned that the cases that relapsed were admitted into hospital and given a full course of treatment with atebirin and plasmochin, that is five days' atebirin followed by five days' plasmochin in doses outlined in table I. Fifty cases were thus treated, 10 cases being adults and 40 children. Routine parasitological examination was made only on admission and discharge. On

TABLE III
Showing parasitic incidence of the relapse cases

B. T.	M. T.	Quartan	Mixed B. T. and M. T.	Unclassified	Parasites not found	Total
17	13	1	4	4	11	50

This table shows (i) that relapses were higher with benign tertian than with malignant tertian and (ii) that benign tertian and malignant tertian infections were the predominating ones.

The months of incidence of benign tertian and malignant tertian parasites are shown in table IV.

TABLE IV
Showing the months of incidence

Months	B. T.	M. T.	Total
August ..	2	4	6
September ..	4	6	10
October ..	5	2	7
November ..	4	1	5
December ..	2	..	2
Total ..	17	13	30

discharge all were negative to malaria parasites; the result of examination on admission has already been shown in table III. It is unfortunate that for want of time the blood of each patient could not be examined daily nor could a comparative study be made with quinine. Temperature finally came down to normal after 2.7 days of atebirin, the amount of atebirin taken being according to age.

The idea underlying the giving of plasmochin was not of course to control symptoms, but to prevent infection in others. As already mentioned, the blood of all patients was examined on completion of plasmochin treatment but crescents were not encountered in a single case, which shows its efficacy as a crescenticide in the dose and length of treatment adopted.

Failures of atebirin therapy.—In one case atebirin failed altogether to control temperature.

TABLE V

Months	Total number examined	NUMBER FOUND POSITIVE					Percentage
		B. T.	M. T.	B. T. and M. T.	Unclassified	Total	
September ..	26	2	3	..	4	9	34.6
October ..	25	5	..	1	1	7	28.0
November ..	25	3	..	2	..	5	20.0
Total ..	76	10	3	3	5	21	27.6

Another case resisted combined administration of atebtrin (by mouth) and quinine (by injection). Two other cases showed a rise of temperature on the day following the completion of the atebtrin course.

Toxic effects arising out of atebtrin and plasmochin treatment.—Yellow discoloration of the skin and eyes was noticed in three cases after the taking of 12 grains of atebtrin; this lasted about a week. One patient complained of diarrhoea after taking $7\frac{1}{2}$ grains of atebtrin—in this case it is difficult to say if the diarrhoea was due to atebtrin or was merely a coincidence. This however did not necessitate stoppage of atebtrin. One patient complained of anorexia after 12 grains of atebtrin, one patient complained of slight abdominal pain after 18 grains of atebtrin. three patients complained of giddiness, two after 12 grains and one after 9 grains of atebtrin. Abdominal pain was complained of by two patients during plasmochin treatment. It may have been due to plasmochin, but was more probably due to its combination with atebtrin that had accumulated in the system. Abdominal pain was relieved by temporarily stopping the drug, using aperients and milk diet.

It will be interesting to mention in this connection that two of the senior writer's private cases developed blackwater fever just after the completion of treatment with atebtrin and plasmochin given consecutively. Short notes of these cases are given below :—

Case 1.—Hindu male, aged 28 years, Bengali, compounder, had been suffering from malarial fever off and on for six or seven months. He experienced the last attack of fever on the 4th October, 1933. The blood slide was negative to malaria parasites. Two injections of quinine bihydrochloride gr. x each were given intramuscularly on successive days and the fever stopped. From the 6th to 10th October he was put on atebtrin one tablet thrice daily. From the 11th to the 15th October he was put on plasmochin one tablet ($\frac{1}{6}$ grain) thrice daily and on the 16th October he developed blackwater fever.

Case 2.—Hindu male, aged 40 years, Bengali, compounder, had been suffering from low fever in the evening for a month and a half, temperature never exceeding 99.4°F . On the 3rd December, 1933, his blood slide showed scanty malignant tertian rings. He had the last attack of fever on the 10th December, 1933. His blood slide was found negative for malaria parasites. Slides were then examined every day till the 20th December and were all negative. From the 10th December, 1933, he was put on atebtrin one tablet thrice daily for five days. From the 15th December he was put on plasmochin one tablet ($\frac{1}{6}$ grain) thrice daily for three days and the next day he developed blackwater fever.

It is significant that all the ill effects mentioned were observed in adults. This suggests that children probably bear these drugs better than the adults.

Contraindications.—We found no contraindications in the administration of these drugs. It is interesting to mention here that one adult female was admitted into hospital with high fever and intense jaundice. She was put

on atebtrin one tablet thrice daily for five days. Temperature finally came down to normal on the fourth day and jaundice disappeared in a further ten days' time. This suggests that malarial jaundice is not a contraindication to the administration of atebtrin. Four pregnant women who underwent the treatment tolerated the drugs well.

Relative cost of quinine and atebtrin.—The cost of a curative course of atebtrin (three tablets daily for five days) is Rs. 2-2. For an adult Indian patient of average health a curative course of quinine (twenty grains daily for seven days) costs annas 8 only. If we consider the relapse-preventing capacity of both the drugs the same, then quinine is decidedly much cheaper than atebtrin.

Summary and conclusions

1. The high incidence of malaria in a 'coolie line' in a tea garden in Assam gave an opportunity to carry out an experiment with atebtrin and plasmochin as to the efficacy of these drugs as prophylactic and therapeutic agents.

2. Two hundred and thirty-four people—159 adults (children over eight years were counted as adults) and 75 children were treated.

3. Prophylactic doses of atebtrin and plasmochin were distributed among the line population in the dosage and by the method described.

4. Those who developed fever were admitted into hospital and given a full course of treatment with atebtrin and plasmochin in the dosage and manner shown in table I.

5. There were 50 relapses* (21.36 per cent)—the vast majority of which were confined to the children population especially among those below two years of age, showing the absence of immunity in them. Of this age group, 11 cases had one relapse, 8 cases two, 3 cases three, and 1 case as many as four relapses.

6. The total infection and total incidence of malaria diminished to some extent; this diminution was due chiefly to the reduction of malignant tertian cases but there was no reduction either in infection or in incidence in benign tertian cases. But even this reduction of incidence in malignant tertian infections was not sufficiently satisfactory to compensate for the expense incurred.

* We consider that the use of the word *relapse* in this connection is misleading. When a patient is transferred to a malaria-free area for treatment, or is treated at a time of year when transmission is not occurring, then it is permissible to refer to a malarial attack as a *relapse*, but, in a highly malarious locality at a time of year when conditions are optimum for transmission, it is scarcely permissible to refer to *any* attack, unless it follows within a few days of the conclusion of treatment for the previous attack, as a relapse, and certainly not to refer to the thirty-five primary attacks—that is to say, primary as far as the experiment was concerned—as relapses, just because the patients had received a course of treatment for an infection which there is no evidence that they ever had, as these writers have done.—EDITOR, I. M. G.

7. The real value of an anti-malarial drug especially as a prophylactic agent can be gauged properly only when its efficacy is proved in terms of children and from this standpoint atebirin and plasmochin have failed, in our experiment, to fulfil the somewhat exaggerated claims made on their behalf. They have, however, decidedly better prophylactic value in adults.

8. We have not been able to determine the efficacy of atebirin relative to that of quinine but it is our impression that as a therapeutic agent atebirin is at least as efficacious as quinine in controlling the clinical symptoms and freeing the peripheral blood of malaria parasites.

9. On the point of toxicity atebirin is decidedly superior to quinine. It does not give rise to neurotrophic symptoms, is well tolerated by children and also those who have an idiosyncrasy to quinine as well as by pregnant women.

10. Ill effects are attributed to the combination of atebirin and plasmochin. In the method and dosage we followed, ill effects were very few and not at all dangerous.

11. The cost of a course of atebirin treatment is much higher than that of quinine but this higher cost is somewhat compensated for by the absence of neurotrophic symptoms. Therefore atebirin is a more suitable drug for those who can afford it but it cannot replace quinine in general use in a poor country like India.

12. Though it cannot be said with certainty that atebirin is a more effective therapeutic drug than quinine, it is undoubtedly a new anti-malarial weapon with some advantages over quinine and being, we hope, the precursor of more potent synthetic preparations has certainly opened up a new path for combating malaria.

13. As a gametocyticide plasmochin should be used in mass treatment, only under proper medical supervision and under suitable conditions.

14. In these days of economic depression, quinine will, in a tea garden, hold its present position till a cheaper and equally or more efficacious remedy is available.

15. We hold a very strong view that the published reports of atebirin and plasmochin treatment as prophylactics lose most of their value unless the age groups of the people so treated are given as well as the average length of time such people have resided in that locality.

Acknowledgments

We are indebted to the directors of the Budla Beta Tea Company, Limited, for sanctioning Rs. 1,000 towards defraying the cost of this experiment and to Colonel H. C. Garbett, C.I.E., V.O., superintendent of the company, for his good offices in obtaining this grant and for his interest and practical help. Our thanks are also due to Mr. H. O. J. Maxwell, manager,

Bokpara Tea Estate, for his co-operation and sympathy in the same and to Dr. D. C. Sen, L.M.F., who was responsible for the completion of the latter part of the experiment.

[During the last few years there has been, both in these columns and elsewhere, a considerable amount of discussion on the use of plasmochin by the sanitarian in an anti-malarial campaign. Experiments have been undertaken and reported; both successes and failures have been claimed—our use of the word *claimed* in connection with the failures is deliberate, as in most instances the writers have adopted an I-told-you-so tone in reporting these—but as a rule the discussions have not risen above the theoretical level. The theoretical case is perfectly clear; malaria, despite its name, is not born of the air and, therefore, if you can clear the population of gametocyte carriers, you must necessarily stop the malaria. Again plasmochin is a drug that will destroy with certainty all the gametocytes in any person to whom it is given in adequate doses. The point over which there is a disagreement of opinion is as to whether the facts that we know about plasmochin can ever be translated into practical politics, and, if the answer is in the affirmative, what are the special circumstances in which this can be done?

Conditions under which malaria exists and has to be controlled are so diverse that a very large number of experiments will have to be carried out to settle these questions; practical experiments, like this one carried out by Dr. Williams and his assistants, are therefore particularly welcome.

The writers have stated that the first object of their enquiry was 'to determine the value of these drugs [atebirin and plasmochin] as a prophylactic in the methods and doses given'. There are two aspects of prophylaxis—personal prophylaxis and general prophylaxis: the object of the former is to protect the person to whom the drug is given from an attack of malaria, of the latter to destroy the gametocytes circulating in his blood so that the general population is protected. There is no drug known to-day that will with any degree of certainty protect a person from malarial infection; neither atebirin nor plasmochin will effect this, even if given in large doses over long periods. However, both drugs given in adequate doses are capable of keeping the malarial infection at a sub-clinical level, as long as their administration is continued, and eventually of killing out the infection in some cases, but in these circumstances they are not acting as prophylactic but as curative drugs.

Dr. Williams gave a single sub-optimal course of atebirin and plasmochin in the middle of the malaria season followed by a single dose of plasmochin twice a week throughout the rest of the season. Even the extremists amongst those who have made 'the somewhat exaggerated claims', to which these writers refer, have never claimed that such a course could possibly protect the recipients from a malarial infection, or even keep the infection at a sub-clinical level beyond the few days during which the atebirin was being taken; we cannot therefore believe that it was personal prophylaxis that Dr. Williams hoped to achieve.

On the other hand this course might be expected to keep the population of the 'line' free from gametocytes (we are not told whether it did or not), and the scheme might therefore have been useful as a general prophylactic measure. The success of this would however depend entirely on whether this 'line' was an isolated one, sufficiently far from other human habitations to ensure that mosquitoes were not getting infected from other sources but we are told that it was adjacent to the hospital and two hundred yards from another line.

One thing that this enquiry has brought out very clearly is the imperative necessity of maintaining a

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THE INSPECTIONAL VALUE OF PHRYNODERMA AND 'SORE MOUTH'

By LUCIUS NICHOLLS, M.D., B.C., B.A. (Cantab.)
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MALNUTRITION may be considered to be due either to disease or to dietary deficiencies. When it is due to the former it may require a long and thorough inspection to find the cause. But the medical inspection of groups of persons such as school children, gangs of labourers constructing railways or other public works, employees in factories, or convicts in jail, is often required to decide the adequacy or otherwise of their diets.

Conclusions from these inspections have been based to a large extent on general appearances. When an individual shows adequate subcutaneous fat, firm muscles, a shining skin, clear eyes, a bright unworried expression and an alert gait, he has been well fed. But when an individual is very thin, or fat and flabby, without muscular tone, has a dry and rough skin, and an appearance of fatigue or hyper-irritability, he is ill fed or diseased.

Not only are there many degrees between these extremes, but a well-fed and healthy person may be thin and not alert, and an improperly-fed person may have ample adipose tissue and retain muscular tone.

Consequently it is difficult to give sound judgment from general appearances, and the conclusions of one inspector may be at variance with those of another; and slack and casual inspection is likely to be the result where the conclusions are made from indefinite signs.

Attempts have been made to determine the state of nutrition of school children by measuring and weighing them, and comparing their heights and weights with those given in standard tables. This method has been far from successful because some children are naturally tall and thin and others are short and stout. It is much better to use the measure and the scales at frequent intervals, and judge from gains or losses, but this requires time and is not always practicable.

Therefore any definite signs, or even symptoms, which are due to dietary deficiencies, will be of great value for the inspections of groups of persons.

In two recent papers (1933 and 1934) I have discussed the prevalence of two signs of dietary

deficiency namely phrynoderma and 'sore mouth' among school children, prisoners, and others in Ceylon. The former sign is due undoubtedly to vitamin-A deficiency, and probably the latter also is due to this deficiency, although there may be other factors. It is not surprising that the poorest classes of the teeming East should fail to obtain a sufficient quantity of vitamin A in seasons when green vegetables are scarce, because they cannot afford comestibles of animal origin which contain this vitamin.

The great value of these two signs for medical inspections has become well established in Ceylon, and are of special importance to school-inspecting medical officers.

The following four examples, selected from among others, will serve to illustrate this:—

Example I.—In an inland town there is situated a well-built school run by missionaries, and they receive and teach four classes of children—(1) orphans who are boarded; (2) day scholars of the poorest classes who are taught in the vernacular; (3) boarders who pay fees and are educated in English; and (4) day scholars who pay fees.

The orphans live apart from the paying boarders and receive a much inferior diet.

Table I shows the results of the inspection:—

TABLE I

	Number examined	SHOWING PHRYNODERMA		SHOWING 'SORE MOUTH'	
		Number	Per cent	Number	Per cent
Day paying scholars	58	5	8.6	8	13.7
Paying boarders ..	54	6	11.1	3	5.5
'Vernacular' day scholars ..	43	20	46.5	16	37.2
Boarded orphans ..	52	43	82.6	20	38.4

The degree of phrynoderma and 'sore mouth' in those children who paid fees was very slight, with the exception of three girls who had advanced phrynoderma, and two who also had 'sore mouth'. On enquiry into their circumstances it was discovered that they were sisters, and had lost their mother and were being 'cared for' by a guardian.

Example II.—An orphanage situated in a country district was inspected. When the inspection was finished, a visit was paid to a free vernacular school in the same district to enable a comparison to be made between the children

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distinction between individuals of different age groups; had the adult population only been taken into consideration in appraising the value of this measure it might have been acclaimed as a success. (But in the absence of any comparable controls even this would have been questionable.) As it is, it must be reported as a failure, but only a failure as far as the special circumstances are concerned, and these appear to have been such that failure was a foregone conclusion.—
EDITOR, I. M. G.]

of the orphanage and those of the poorer classes living at home. Table II gives the results:—

TABLE II

	Number examined	SHOWING PHRYNODERMA		SHOWING 'SORE MOUTH'	
		Number	Per cent	Number	Per cent
Orphanage ..	130	83	63.8	33	26.0
Vernacular school ..	75	16	21.3	5	6.6

An enquiry was made concerning the morbidity and mortality at the orphanage, and it was obvious that both were very high but exact figures could not be obtained because it was customary to send sick children to their relatives or to hospitals and to avoid deaths taking place on the premises. Despite this it was found that among 313 children between the ages of 6 and 14 who had entered the orphanage there had been 18 deaths.

This is a death rate of 57 per 1,000 which is ten times as high as among children between these ages of the general population, where the death rate is 5.8.

Example III.—A drought affected the greater part of Ceylon during this year (1934), and this was particularly severe in the Northern provinces.

Mannar is a small town situated on a northern island, which is connected by a long causeway with the mainland. Here there had been no rain for seven months and it was reported that the inhabitants were unable to obtain sufficient food.

Before examining the children of this town, a village school twelve miles away on the mainland was visited. This village was situated between two large tanks and water was still available from one of them for the irrigation of gardens, and vegetables were procurable by the poorest classes. The diets of the children consisted of unpolished rice, fresh tank fish or dried fish, vegetables, and a small amount of fruit.

The vernacular children of Mannar were inspected on the following day. Their diets consisted of unpolished rice, dried or fresh sea fish, and the saccharine juice of the fruit of the palmyra palm, and a few children occasionally obtained a small amount of vegetables.

The country was parched and no leafy or ground vegetables were to be seen growing anywhere. In the compounds of the better classes there were seen shrubs and trees bearing 'vegetables' or fruits, such as drumsticks, pomegranates, limes and bananas, which were being irrigated with small amounts of water from wells.

The following table (table III) shows the comparison between the vernacular children of Mannar and those of the school in the village 12 miles distant.

TABLE III

	Number examined	SHOWING PHRYNODERMA		SHOWING 'SORE MOUTH'	
		Number	Per cent	Number	Per cent
Mannar ..	150	33	22	23	15.3
Village ..	70	4	5.7	6	8.6

Example IV.—In conversation with Dr. Crawford, the Government Veterinary Surgeon, I mentioned that milk or eggs quickly cured phrynoderma and 'sore mouth'. He remarked jokingly that the children of the coolies who milked the cows at the Government Dairy should be free from those conditions. An inspection was arranged and the next morning 46 children of the workers at the dairy were lined up. I picked out six children from different places in the line, four of them had marked phrynoderma two also showing 'sore mouth', the other two had slight phrynoderma. The rest of the children were not only free from these signs but also had unusually good teeth for this class of child in whom decay following hypoplasia is very common.

Dr. Crawford called for the fathers of the children I had picked out, one coolie claimed the four of them that had the most marked signs, and another coolie claimed the other two. The first coolie was in charge of the stud bull, he had nothing to do with the milking of the cows, and was of a different caste to the other coolies. The second coolie was a cleaner, who did not milk the cows.

Discussion

Other orphanages in Ceylon have been inspected and the results have been much the same as those given in examples I and II.

The children of these institutes usually are supplied with ample rice, and in the ordinarily accepted sense of the term they are not being starved. Undoubtedly those in charge of them would resent such a suggestion. The type of diet the poorer classes obtain in their own homes consists of rice, a small quantity of dried or fresh fish, vegetables, and the usual condiments for curry, also *dāl* or green gram may or may not be added to the curries.

Now there is a considerable difference when such diets are prepared by housewives, and when they are prepared in institutions. The

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THROMBO-ANGIITIS OBLITERANS

By D. C. CHAKRAVARTI, F.R.C.S. (Edin.)

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THIS condition was recognized first by Von Winiwarter in 1879 and described by him as endarteritis obliterans. It has been fully described by Buerger recently, and it was he who gave it the name of thrombo-angiitis obliterans.

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former have learnt to produce variety, especially with the vegetables. A number of different plants having edible leaves or fruits grow in the gardens and jungles, and these are obtained by the women of the indigent classes. There is a Sinhalese proverb which points out the necessity of a daily addition of green leaves to the diet. Also there are many varieties of dried fish. Therefore the housewives are able to mitigate the monotony of the daily curry.

The managers of orphanages obtain their supplies from the cheapest vendors. Only vegetables which are obtainable in bulk and are easily handled are supplied: and pumpkins, gourds, coarse cucumber, drumsticks and bread fruit in season are the main vegetables supplied. The dried fish is the cheapest obtainable. The diet may be varied by giving a *dāl* curry once or twice a week, and occasionally a meat curry. Fruit is seldom given.

It is this lack of variety which plays a great part in producing the signs of food deficiencies among the orphans.

A similar state of affairs has existed in the prisons (Nicholls, 1933). Many of the convicts come from the indigent classes, and in their normal lives they obtain only the barest of dietary necessities. The punishment factor in jail life has been accentuated in the past, and it has been judged unreasonable to supply convicts with a diet as good or better than that obtainable by them when at liberty.

The law has declared a penal diet, whereby a convict, during the first fortnight or month of incarceration, is supplied with a diet deficient in proteins and vitamins; and it is not astonishing that a large number of prisoners have shown phrynodema, 'sore mouth' and other signs of vitamin deficiencies.

The diets of the indigent classes being on the threshold of deficiency cannot be further reduced without affecting the health of those who consume them.

It is probable that in other tropical countries these two signs will be found of great value in checking up the adequacy of diet.

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It is characterized by the following:—

(a) It is a disease of the larger blood vessels showing the histological characters of an inflammatory lesion. The larger arteries of the limbs are generally affected. Veins are also affected to a certain extent. Thrombosis occurs and is followed by organization of the clot. This produces embarrassment of the circulation.

(b) It usually occurs in males, generally between the 30th and 40th years.

(c) The lower limbs are more commonly affected than the upper.

(d) It is said to occur mostly amongst the Jews, but is found in other races.

(e) Its origin is not known. Michel in 1909 noted the importance of smoking as a factor in causing it, but it is not known if the bad effects are due to the vasoconstricting action of nicotine, or tobacco sensitization of endothelium of arteries and veins.

Symptomatology.—The patient's first complaint is intermittent claudication with the sensation of severe pain, rigidity or constriction about the calf of leg. The pain is produced and increased by exertion, e.g., walking. The ability to walk any distance gradually diminishes.

The cases are all bilateral but as a rule the symptoms are noticeable on one side more than on the other. Some cases also complain of vascular disturbance in the hands. These disturbances are of the nature of spasmodic Raynaud's type.

The feet are cold; their colour is dusky owing to cyanosis. Dependent position of the limb produces some degree of rubor in nearly all cases. It is marked by absence of pulse in the dorsalis pedis, posterior tibial, popliteal and even in the femoral arteries. Later on a peculiar rubor, oedema and trophic lesions appear, and, in more severe forms, gangrene develops calling for amputation. A common mode of onset of these grave troubles is by an onychia, usually of the great toe, the nail-bed being ultimately transformed into an intractable, callous and painful ulcer with no tendency to heal.

Superficial thrombo-phlebitis is occasionally found in association with it. Many of these cases suffer from intolerable rest pain which causes a rapid deterioration of health.

Pathological changes.—Telford and Stopford (1924) noticed the following changes in the vessels:—

'There is lymphocytic invasion of the coats of the arteries and veins. Cells are replaced by fibrous tissue and new vessels may be seen extending through the adventitia to the media. Along with these changes parts of the lumen become occupied by a clot which is gradually organized. In this obliterating connective tissue a number of small channels are found which have a lining of endothelium surrounding this; some possess a thin coat of smooth

muscles. After these changes have occurred in the lumen collections of lymphocytes not unlike tubercles often make their appearance and persist until they are replaced by fibrous tissue. There is some irregular thickening of the intima and only very slight proliferation of the internal elastic lamina. At a later stage the fibrous tissue in the lumen has a denser appearance, but this may partly be due to contraction of newly-formed fibrous tissue in the media and adventitia. This contraction may be an important factor in the production of gangrene, because it leads to compression and occlusion of many of the newly-formed smaller channels in the connective tissue in the lumen'.

Serum calcium and coagulability time do not show any change.

Duration.—Variable.

Syphilis.—This has nothing to do with the condition, as the Wassermann reaction is usually negative.

Treatment.—Various methods of treatment have been tried, e.g., periarterial sympathectomy, attacks on the suprarenals, injection of typhoid vaccine, acetylcholine, muscle extract and padutin, but they have failed to effect any permanent benefit.

Owing to the fact that this disease has an element of vasospasm, which is according to some the essential cause of the disease and according to others only a superadded factor, surgeons have suggested various forms of sympathectomy.

In order to enable the readers to follow the results of the operations described, an outline of the anatomical and physiological principles which underlie these operations performed on the sympathetic system is given below.

The peripheral portion of the sympathetic system consists of (a) preganglionic fibres, (b) ganglionated trunks, (c) visceral ganglia, (d) postganglionic fibres, and (e) rami communicantes.

Preganglionic fibres.—There are cells termed 'connector cells' in the lateral horn of the spinal cord which are present only in all the thoracic and the upper three lumbar segments.

The axons of these cells leave the cord in the anterior roots of the nerves arising from those segments. They leave the anterior roots in white rami communicantes and reach the sympathetic trunk and end by arborizing round the ganglion cells, etc. They convey impulses from the spinal cord to the sympathetic system and are termed by Langley 'preganglionic fibres'.

Ganglionated trunks.—These extend one on each side of the vertebral column from the base of the skull to coccyx. Each consists of preganglionic fibres and ganglion cells grouped together at intervals to form ganglia whose number does not tally with the segments of the cord. The cervical region has 3, dorsal 11 or 12, lumbar 4 and sacral 4. These are concerned

with sympathetic innervation of the extremities, head and neck and thoracic viscera. They have nothing to do with abdominal viscera.

Visceral ganglia.—The important ganglia in the abdomen are the coeliac, superior mesenteric and inferior mesenteric. Bundles of nerve fibres run to these ganglia from the trunks in the lower thoracic and lumbar regions and are termed thoracic and lumbar splanchnic nerves.

Postganglionic fibres.—Cells of both the trunk and the visceral ganglia are known as 'excitor cells' and their axons, the postganglionic fibres, pass ultimately to blood vessels, sweat glands, eye, thoracic and abdominal viscera. Bundles of these fibres are given off from all the ganglia of the trunks to join the spinal roots and every spinal nerve is thus provided with a sympathetic supply. These are known as grey rami communicantes.

Rami communicantes.—*White*—14 or 15 on each side, contain preganglionic fibres. All sympathetic impulses leave the spinal cord through these. *Grey*—more numerous, composed of postganglionic fibres, distributed through spinal nerves to blood vessels, sweat glands and arrectores pilorum muscles of head, neck, trunk and limbs. No impulses pass along these to thoracic and abdominal viscera.

Sympathetic supply to head.—The blood vessels of the head, neck and eye are supplied from connector cells in the 1st and 2nd thoracic segments whose preganglionic fibres leave the cord in the white rami communicantes and passing up the trunk end around the excitor cells in the superior cervical ganglion. Many of the postganglionic fibres pass thence along branches of the external and internal carotids, others accompany branches of the cervical plexus.

Supply to arm.—Connector cells for the arm lie in the mid-thoracic region from the 4th to 9th segment. Preganglionic fibres pass from these segments and ascend the trunk to end in the middle and inferior cervical, 1st and 2nd thoracic ganglia. Grey rami pass from these ganglia to the brachial plexus and are distributed with the branches of the plexus.

Supply to leg.—Connector cells are in the lowest three thoracic and upper three lumbar segments. Preganglionic fibres pass out in white rami and end in the 2nd, 3rd and 4th lumbar and in sacral ganglia. Grey rami from the 2nd lumbar ganglion downwards contain postganglionic fibres which are carried to the periphery through the lumbar and sacral plexuses. It is therefore clear that if the 2nd, 3rd and 4th lumbar ganglia and intervening portions of the trunk be removed, excitor cells to lumbar nerves and preganglionic fibres to sacral nerves will be removed and sympathetic denervation of the leg will be thus achieved.

The following case will show the effect of lumbar sympathectomy :—

D. P. D., Hindu male, aged 35 years, occupation, clerk. Admitted on the 28th October, 1933.

Chief complaints.—Inability to walk even for a short distance without severe pain in the calf of the right leg and foot; sensation of cold in the affected limb; bluish discoloration of the right foot and leg extending up to the knee joint and pain relieved by the application of warmth and keeping the limb elevated.

It was stated by the patient that he had been keeping very good health before this. No history of venereal disease.

Wassermann reaction, negative. He was in the habit of smoking 15 to 20 'biris' (country-made cigarettes) daily. No pulsation of the dorsalis pedis, posterior tibial or popliteal could be felt. Femoral pulsation could be easily felt and was similar on the two sides. The right saphenous vein was very prominent and felt like a cord, it was very tender to touch up to the knee joint. Muscles of the affected limb were atrophied, due to disuse; otherwise motor and sensory functions were normal.

Blood pressure.—Systolic, 130 mm. Hg.; diastolic, 90 mm. Hg.

Treatment adopted.—As the patient's general condition was very poor and as he was not considered a fit subject for operative treatment a conservative measure in the form of padutin injection was tried with the idea of causing dilatation of minute vessels. Twelve injections were given, 1 c.cm. daily.

Effects.—The pain was much less, the leg became warmer than before, discoloration was much less, the patient could walk a little distance without the cramp-like pain, and the blood pressure was reduced—systolic, 110 mm. Hg.; diastolic, 80 mm. Hg.

He was discharged relieved on the 3rd December, 1933, but was readmitted on the 24th February, 1934, with the complaint that all the symptoms had reappeared a fortnight after his discharge from the hospital. Besides his usual complaints he came to the hospital this time with gangrene of the tip of the right great toe. General health was almost the same as before, but he was absolutely crippled, complaining of constant severe pain even at rest. Pain was so severe that the patient had to be given morphia twice daily.

Operation.—Lumbar sympathectomy was performed under general anaesthesia on the 6th March, 1934.

The abdomen was opened by a right paramedian incision about six inches long. The incision was partly above and partly below the umbilicus. The coils of the small intestine were packed off to the left and the posterior parietal peritoneum was incised just lateral to the caecum and ascending colon. The colon was pushed

aside exposing the right psoas major muscle, ureter and inferior vena cava. After identifying these, the inferior vena cava was retracted gently to the left and the psoas major to the right. The gangliated cord of the sympathetic was found lying near the medial border of the muscle on the bodies of the lumbar vertebrae. The duodenum was pushed upward and the second lumbar ganglion was identified and the trunk cut just above this ganglion. The trunk was then traced downward and found passing behind the right common iliac artery. It was divided below at this level and this portion of the trunk with the second, third and fourth ganglia was removed. The colon was placed back in position after arresting very troublesome haemorrhage from the lumbar veins and the posterior parietal peritoneum was stitched up. The abdominal wall was closed without any drainage.

Effect of the operation.—Its effect was like magic, because the patient was relieved of his excruciating pain immediately. The affected part became warmer gradually. Unfortunately the patient passed through a very stormy convalescence as he developed post-operative pneumonia and his condition was very critical. However, he got over this and was discharged very much relieved on the 16th April, 1934.

He was again admitted for the third time on the 13th June, 1934, for gangrene of the right great toe. Lumbar sympathectomy had no effect on this toe. It showed an ulcer covered with slough a little proximal to the interphalangeal joint. The last phalanx was protruding through the slough. There was bluish discoloration of the skin round the base of the toe. His general health had improved considerably. Bluish discoloration of the skin of that leg almost disappeared. He said that he had not experienced the constant pain after the operation, but complained of pain only in the affected toe.

Treatment advocated by Saul S. Samuels (1934) was strictly followed this time :—

Rest in bed, the extremity being constantly kept in a horizontal position.

No smoking.

Intravenous saline injection; in this case fourteen injections of 300 c.cm. of a two per cent solution were required.

[Mayesima in 1911 observed increase in the viscosity of the blood in these cases, so he advised intravenous saline injection of 250 to 300 c.cm. of a two or three per cent solution daily.]

Local treatment to aid in the development of the line of demarcation, to maintain the dead and dying tissues as aseptic as possible, and to control pain, a foot-bath of borie lotion and an anaesthetic ointment of camphor and phenol one per cent each were applied to all exposed areas.

The last phalanx dropped off, the ulcer healed up quickly and the local pain disappeared.

A case of symmetrical gangrene treated by cervical ganglionectomy

I. B., Mahomedan male, aged 40 years, occupation, cultivator. Admitted into the Campbell Hospital on the 6th January, 1934.

Chief complaints.—Pain in the fingers and both forearms; pain in the toes and feet, more marked in the left, but it started in the right side first; callous ulcer on the right index finger, intermediate phalanx being bare and protruding through the middle of the ulcer; the last two phalanges of the left index and ring fingers said to have dropped off, stumps showing irregular scar tissue; an ulcer on the dorsal aspect of the right great toe showing no tendency to heal; and the right little toe was said to have dropped off about 10 months before admission.

Duration.—A year and a half.

On examination no pulsation of either radial and ulnar arteries could be elicited. Absence of pulsation of right dorsalis pedis and posterior tibial. The right hand and forearm were colder than the left. The right index finger was gangrenous, there was no line of demarcation and the discharge was purulent and very offensive. No thrombo-phlebitis was present. Wassermann reaction, negative. Patient's general condition was good. He was in the habit of smoking 'biris'.

Blood pressure.—Systolic, 100 mm. Hg.; diastolic, 70 mm. Hg.

Patient being a male, and pulsation of arteries being absent, the case was thought to be a case of thrombo-angiitis obliterans affecting all the four limbs. This is very rare indeed.

Treatment.—Padutin injections were first tried without any results. The patient would not submit to laparotomy, so cervical ganglionectomy operation was performed on the right side on the 5th March, 1934.

Operation.—A collar incision was made just above the right clavicle about four inches long. Skin, superficial fascia, platysma and fascia colli were cut. The external jugular vein was ligated in two places and was cut in between. The inferior belly of the omohyoid was found and divided, and the scalenus anterior and the phrenic nerve lying in front of it were exposed. The nerve was retracted medially and the muscle was cut transversely a little above its insertion; thus the second part of the subclavian artery was fully exposed. It was now necessary to ligature and cut the transversus colli artery. Sibson's fascia was separated from the inner border of the first rib

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OBSERVATIONS ON SPINAL NOVOCAINE ANÆSTHESIA

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THE object of this short paper is not to discuss the technique of spinal anæsthesia, but to record untoward symptoms observed during the period the patient is under the influence of

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by the pressure of the index finger and the subclavian vessels and the dome of the pleura were pushed downward. The inferior cervical ganglion was identified lying on the neck of the first rib. The first and the second thoracic ganglia were identified and the sympathetic trunk was cut transversely below the second ganglion. The cut end was reflected upward and the connections of the ganglia with the brachial plexus were cut and the trunk was divided above the stellate ganglion. The soft tissues were placed back in position, the fascia colli was stitched up and the wound was closed without any drainage as there was practically no bleeding.

Results of the operation.—Ptosis was marked, the conjunctival vessels were engorged, the tension of the eyeball was less, the palpebral fissure was considerably reduced, and the right pupil was contracted. These physiological effects lasted for about a month. He was seen three months after the operation and the above-mentioned eye changes were almost absent.

Forearm and hand of that side were distinctly warmer. No change in the pulsation of the radial and ulnar arteries was noticed.

There was a marked change in the ulcer of the right index finger. There was a distinct line of demarcation and the necrosed phalanx dropped off. Later on a disarticulation was performed through the metacarpophalangeal joint and the wound healed by first intention.

No weakness of the muscular power was noticed. The patient never complained of pain in that hand and forearm.

As the patient refused laparotomy for lumbar sympathectomy which was considered necessary for the toes, he was discharged on the 4th April, 1934.

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the anæsthetic and also the variations in blood pressure, which have enabled me to draw some conclusions regarding indications and contra-indications for spinal anæsthesia, so far as blood pressure alone is concerned.

Amounts varying from 13 to 16 c.cm. of a 1 per cent solution of novocaine for high and from 1½ to 2 c.cm. of a 7½ per cent solution for low spinal anæsthesia were used.

A small percentage of patients exhibited no untoward symptoms. Some complained of a feeling of oppression in the chest soon after the injection. About 90 per cent of the patients who had no form of pre-operative treatment vomited, some only in the beginning, others throughout the operation. About 50 per cent of them sweated profusely. Other symptoms such as yawning, restlessness, difficulty in breathing, a tendency to stretch the arms, ineffectual attempts to move the anæsthetized portion of the body, hiccough, mental confusion, and intense thirst were observed at times.

With the help of the house-surgeons in charge of the surgical wards, I adopted the following pre-operative treatment in twelve cases, choosing them indiscriminately.

Three doses of a mixture containing 10 minims of tincture of belladonna and a drachm of sodium bicarbonate to an ounce of water were

given beginning from the evening prior to the day of operation. Half an hour before the thecal injection, a ¼ grain of morphia and 1/75 grain of atropine were given hypodermically. Ten out of twelve patients were absolutely quiet throughout the operation. The other two had only slight nausea. I consider that the above form of pre-operative treatment should be effective in all cases of spinal anæsthesia, as most of the untoward symptoms observed are due to sympathetic paralysis and consequent relatively excessive vagotonia. In fact it is the vagotonies who suffer more than the sympathetico-tonies. The latter are really the few people who stand spinal anæsthesia very well without the aid of any form of pre-operative treatment.

Blood pressure readings were taken before and immediately after the spinal injection, and also every five minutes throughout the operation. A half c.cm. of adrenalin was given as a routine in all cases. Although it might have modified the actual variations in blood pressure, it does not materially modify our deductions, as adrenalin was used in all cases.

I am inclined to draw the following tentative conclusions, though they require to be substantiated by further observations.

(Continued at foot of next page)

Blood pressure in spinal novocaine anæsthesia in all patients

	Age	Diseases	INITIAL BLOOD PRESSURE			AFTER INJECTION AND BEFORE OPERATION			LOWEST RECORDED AND TIME TAKEN TO REACH THIS				AMOUNT OF FALL	
			Systolic	Diastolic	P. P.	Systolic	Diastolic	P. P.	Systolic	Diastolic	P. P.	Minutes	Systolic	Diastolic
1	28	Duodenal ulcer	105	70	35	65	35	30	55	30	25	15	50	40
2	30	"	90	70	20	90	70	20	40	25	15	15	50	45
3	35	"	90	60	30	80	50	30	55	35	20	15	38	25
4	40	"	85	45	40	80	40	40	65	35	30	15	20	10
5	20	"	90	50	40	90	50	40	80	35	45	25	10	15
6	35	"	115	70	45	90	50	40	50	30	20	5	65	40
7	35	"	105	50	55	90	40	50	55	30	28	10	50	20
8	35	"	100	50	50	70	40	30	65	30	35	10	35	20
9	40	"	100	60	40	80	40	40	30	20	10	15	70	40
10	30	"	105	65	40	100	60	40	55	30	25	15	50	35
11	30	"	90	40	50	90	40	50	50	30	20	15	40	10
12	20	"	100	70	30	75	55	20	40	20	20	20	60	50
13	30	"	115	80	35	120	70	50	80	40	40	10	35	40
14	26	"	90	70	20	65	40	25	50	30	20	15	40	40
15	35	"	110	65	45	75	50	25	40	25	15	15	60	40
16	27	"	100	40	60	90	40	50	60	30	30	10	40	10
17	30	"	100	55	45	100	55	45	90	40	50	15	10	15
18	35	"	105	65	40	60	35	25	55	35	20	10	50	30
19	25	Hernia	115	70	45	85	40	45	60	30	30	15	55	40
20	30	"	105	55	50	100	55	45	70	30	40	15	35	25
21	40	"	135	80	55	130	60	70	90	55	35	10	45	25
22	23	"	105	70	35	60	35	25	30	20	10	10	75	50
23	32	Appendicitis	90	45	45	75	30	45	50	20	30	10	40	25
24	25	"	95	50	45	90	50	40	50	25	25	15	45	25
25	36	"	120	55	65	100	50	50	60	30	30	10	60	25
26	30	Sarcoma thigh	115	55	60	100	55	45	45	25	20	55	70	30
27	40	Gastric ulcer	140	110	30	80	40	40	30	20	10	10	110	90
28	35	T. B. cæcum	100	50	50	95	50	45	60	35	25	10	40	15
29	17	Hydrocele	120	65	55	110	45	65	80	40	40	10	40	25

THE INFLUENCE OF FRESH BILE ON GUINEA-WORM LARVÆ ENCYSTED IN CYCLOPS

(A PRELIMINARY REPORT)

By V. N. MOORTHY, BSC, M.B., B.S., D.P.H., D.T.M.

Guinea-worm Research Officer

Office of the Director of Health, Bangalore

WHILE conducting a series of infection experiments of *Barbus puckelli* fish with guinea-worm embryos it was noticed that, in specimens of the fish that had died of very heavy infection, the gastro-intestinal tract was invariably flooded with a large quantity of bile. This observation suggested the study of the effect of fresh fish bile on guinea-worm embryos and also on cyclops infected as well as uninfected. It was found that fresh bile of the following species of fish, *Barbus puckelli*, *Barbus punctatus* and *Barbus gelius*, exerts a definite lethal action on cyclops and also on guinea-worm embryos. When undiluted fresh bile was used, it was found that it took about one to two minutes to kill the cyclops and two to three hours to kill the embryos. When its effect on cyclops infected with guinea-worm embryos a fortnight before was observed, it was interesting to note that it had identically the same effect as 0.2 per cent HCl first described by Leiper (1906). It killed the cyclops in the course of one to two minutes and activated the encysted larva. The larva thus activated disorganizes the entire internal structure of the cyclops by its powerful coiling, uncoiling and twisting movements and, in some, it even succeeds in finally escaping out of the body cavity of the

cyclops after about thirty to thirty-five minutes by making an opening through the most vulnerable portion of the cyclops. The position of release seen in the photomicrograph (figure 1)—the junction of the anal segment with



Fig. 1.—Photomicrograph of cyclops infected with guinea-worm embryos 15 days previous to the experiment and treated with the bile of *B. puckelli*. The larva was killed by 30 per cent formalin solution when it was just escaping from the cyclops and then was mounted in two per cent glycerine formalin solution. The larva is seen just escaping through an opening it had made in the cyclops at the junction of the caudal ramus with the anal segment.

(Continued from previous page)

(1) The fall in blood pressure is great in a patient with high diastolic and low pulse pressure. Hence spinal anæsthesia is contraindicated in such cases.

(2) Provided the cardio-vascular system is otherwise normal, a systolic pressure even as low as 80 with a diastolic pressure of 45 or over is no contraindication for spinal novocaine anæsthesia. On the other hand I consider such patients better suited for spinal novocaine anæsthesia, as the system is more adapted to low blood pressures.

(3) Diastolic pressure below 40 is a definite contraindication.

(4) The fall in blood pressure is slower and steadier when the initial blood pressure is low.

I have deliberately made these conclusions dogmatic, with the idea of stimulating discussion from anæsthetists, based on their own personal experiences.

My thanks are due to Colonel K. G. Pandalay, I.M.S., and Dr. Mangesa Rao, for the facilities they have given me for making these observations.

the furcal rami of the cyclops—was the most common site through which the guinea-worm embryo escaped. The result was the same when the infected cyclops was treated with fresh goat's bile and sheep's bile, but the time taken to kill the cyclops was nearly thirty to thirty-five minutes and it took on an average sixty-five minutes for the encysted larva to escape. Observations so far made with human bile got by post mortem six hours after death, from a case of suicidal hanging, indicate that it also has an identical effect on infected cyclops; the larva is not, however, activated to the same extent as in the case of fish bile; it takes on an average twenty minutes for the cyclops to be killed and seventy-nine minutes for the encysted larva to escape from the cyclops.

In all the observations made by N. Hamilton Fairley and W. Glen Liston (1924) they have found that, though saliva and pancreatic juice (artificial) had definite lethal action on cyclops,

these secretions did not stimulate the encysted larvæ and in none of the specimens of infected cyclops treated with these secretions did the larvæ escape out of the body cavity of cyclops

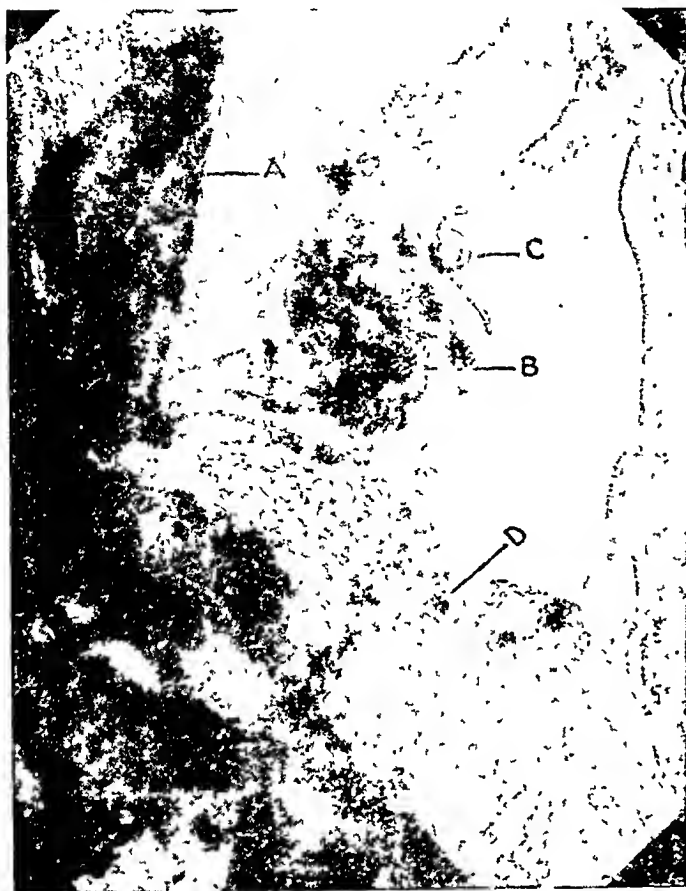


Fig. 2—Photomicrograph of infected cyclops treated with the bile of *B. gelius*. A. Fish gall-bladder opened to let out bile. B. Infected cyclops lying on the fish gall-bladder. C. The guinea-worm embryo that escaped from the cyclops when treated with fish bile. D. Anal segment of cyclops through which the embryo escaped

unless mechanical trauma was superadded. The action of fresh bile on infected cyclops seems thus to differ from the action of these digestive secretions in that it not only kills the cyclops but also activates the encysted guinea-worm embryo which in some cases even escapes out of the body cavity of the cyclops. It is also of interest to note that fresh bile, though alkaline in reaction, has the same stimulating effect on the encysted guinea-worm larvæ lying in the body cavity of the cyclops as 0.2 per cent HCl, i.e., the percentage of HCl found in the normal gastric juice of human beings.

Since it was clear from the above experiments that fresh bile had practically the same effect on infected cyclops as human gastric juice, an attempt was later on made to determine whether the liberated guinea-worm embryo undergoes any further developmental changes in the gastro-intestinal tract of *Barbus puckerli* in the same manner as it does in human beings. Such infection of fish with other parasitic

nematodes is not unknown; for instance in *Camallanus lacustris* infection first worked out by Leuckart (Henry B. Ward and George C. Whipple, 1918) the mechanism of infection is recognized to be due to the fish feeding on cyclops infected with *Camallanus lacustris* larva. The larva gains entrance to the cyclops and bores its way into the body cavity where the first moult occurs. Later it moults once or twice again and in addition undergoes certain developmental changes such as losing its tail in part, developing an oral armature and bipartite œsophagus, etc., resembling thus to a large extent the developmental changes of the guinea-worm embryos that take place in the body cavity of cyclops. The period required for these developmental changes to take place varies from about three days in summer to three weeks in winter. Further developmental changes take place in the alimentary canal of a suitable fish host where, after ingestion, the worm, if set free from the larval host, grows rapidly and in about ten to fourteen days the young worm becomes fully mature and pairs. Observations so far made on fish fed with cyclops infected with guinea-worm embryos, a fortnight before the experiment, and the examination of their intestinal contents at definite periodical intervals have shown the presence of nematode larvæ which appear to be the developed stages of guinea-worm embryos. This work is still in progress and full experimental details will be published in a subsequent communication.

I am greatly indebted to Dr. J. V. Karve, Director of Health in Mysore, for the very valuable help and guidance which he has given me in doing this work. My thanks are also due to Mr. L. N. Rao of the Central College, Bangalore, for having kindly helped me in taking the photomicrographs.

Summary of observations

1. Fish bile has a definite lethal action on cyclops and guinea-worm embryos and on infected cyclops it has identically the same action as 0.2 per cent HCl, i.e., it kills the cyclops and activates the encysted larva and, in some, the larva finally escapes out of the body cavity of the cyclops by making an opening generally in the last segment of the abdomen or in the caudal ramus.

2. Human bile, goat's bile and sheep's bile have also the same effect on cyclops and infected cyclops as fish bile.

3. When *Barbus puckerli*, *Barbus punctatus* or *Barbus gelius* is fed with cyclops, infected with guinea-worm embryos a fortnight before, the liberated embryos appear to undergo further development in its gastro-intestinal tract.

(Continued at foot of next page)

A SIMPLE FLY TRAP

By J. F. JAMES

LIEUTENANT-COLONEL, I.M.S.

Commanding Officer, Combined Indian Military Hospital, Razmak

In dealing with flies, apart from preventive measures in limiting breeding grounds, the sugar, or *gur*, arsenic poison is a most effective one especially in dry weather.

The solution consists of :—

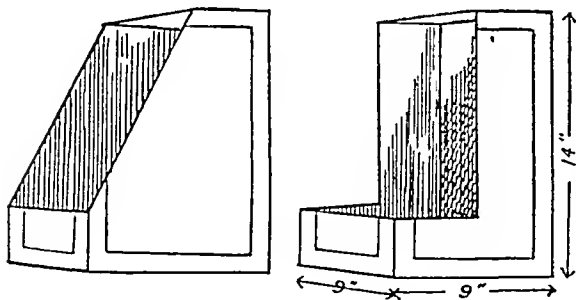
Sugar, molasses or <i>gur</i>	..	..	1 lb.
Arsenite of soda	..	..	1 lb.
Water	..	..	10 gallons.

It is extremely poisonous to human beings and animals and care should be taken that the latter do not obtain access to it.

The wooden trap with rollers usually employed to exhibit the poison has been found to be somewhat unsatisfactory, as, apart from its cost, it is liable to leak and to breakage.

After considerable experiment the following pattern has been devised :—

An empty *ghi* tin is placed upright and cut across the top medially. A similar cut is made parallel across the front of the tin about three inches from the bottom and the cut extended up each side to meet the top cut, the part removed being shaped like a banker's shovel. A modified pattern is made by cutting perpendicularly through the top to within three inches of the base and then horizontally through half the tin. A stout wire is passed across the top of the tin about two inches from the back and looped above to enable the tin to be hung on a wall or other support. (This is not shown in the sketch below.)



The portion of wire across the inside of the tin serves as a support for *gunny* or other material. The *gunny* should extend to the

(Continued from previous page)

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bottom of, and also cover the floor of, the tin. The upper part of the *gunny* can be wetted with the poison solution by laying the tin flat. The lower part is of necessity always wet. The reservoir for the poison solution is the lower three inches of the tin and about one inch depth of solution is ample.

These *ghi*-tin fly traps can be turned out very quickly at a cost which is negligible. About 400 of these or a similar pattern are at present in use in this station. They are collected, cleaned and the solution changed twice weekly under the direct supervision of a sanitary inspector.

The *ghi* tins referred to measure about 14 inches by nine inches by nine inches and would be available on service in the field. Smaller or larger tins can however be similarly cut to serve the same purpose, e.g., gallon tins which are used for lubricating oil.

A Mirror of Hospital Practice

A CASE OF RECURRENT VITREOUS HÆMORRHAGES

By G. S. GUHA, M.B.

Laitumkrah, Shillong

J. R. M., a young male working as a laboratory assistant at the Pasteur Institute, Shillong, was sent to me by the Assistant Director of the Institute for examination of his right eye. The patient complained of sudden dimness of vision in his right eye without any apparent cause such as trauma or any sort of muscular strain. On external examination, nothing abnormal was found except that the vision in that eye was reduced to finger counts only at a distance of about three metres. On ophthalmological examination, a big speck of hæmorrhage was found as shown in figure 1. The fundus looked hazy, probably due to an

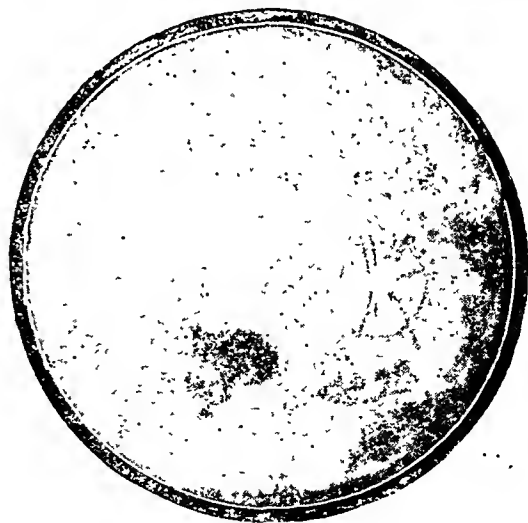


Fig. 1.

accumulation of blood in the vitreous. The patient was advised absolute rest in bed. His blood was then

examined for the Wassermann reaction which was absolutely negative; the urine was also found to be normal. No other septic focus, *c.g.*, in the teeth or tonsils, could be found. After a few days' rest in bed the bleeding spot seemed to be a little smaller. He was then put on an iodide mixture. For the first three or four days, he did not note any change in the vision of his affected eye but later on he complained of a further loss of vision. On ophthalmological examination, it was practically impossible to see the fundus owing to a darkish haze in front, caused no doubt by an accumulation of blood in the vitreous. Thinking that a further bleeding had taken place, I gave him a few calcium injections. In addition he was given subconjunctival saline (normal) on every alternate day in doses of 0.2 c.cm., 0.4 c.cm., 0.5 c.cm., 0.5 c.cm., 0.5 c.cm., and 0.5 c.cm. After this course of subconjunctival saline was over, his right eye was again examined by the ophthalmoscope and it was found that the haze in the vitreous was much reduced but another small speck of hæmorrhage (as shown in figure 2) and some opacity

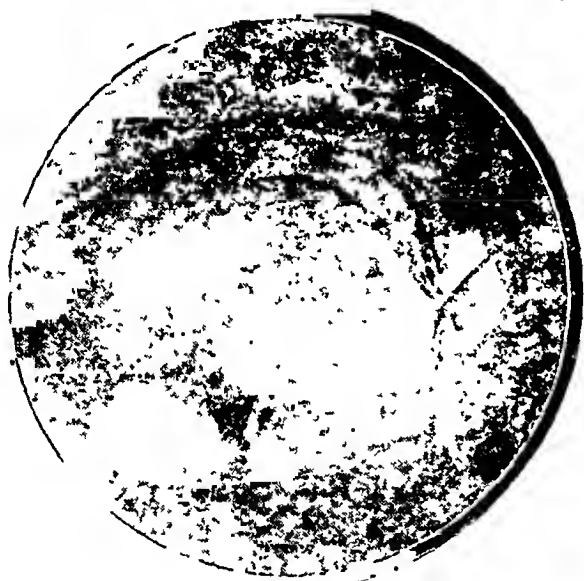


Fig. 2.

in the lower portion and in front of the fundus was seen. The patient was again given subconjunctival saline (double strength of normal saline), put on an iodide mixture of thirty grains of potassium iodide per dose, twice daily after food, and calcium injections in the form of colossal calcium with vitamin D (Glaxo) twice weekly. The patient gradually noted an improvement in his sight. His vision in the right eye is at present 6/9. But on movement of his eyes up and to the sides, he complains of seeing some screen-like shifting opacity in front of the right eye. On ophthalmological examination, I found the fundus to be absolutely clear except that in the lower portion a small area of a glistening fibrous band of tissue, probably retinitis proliferans, extended into the vitreous.

Recurrent hæmorrhages in the vitreous, known as Eales' disease, usually affects both eyes and is commonly due to deficiency of some blood constituent or to the changes in the endothelium of the retinal vessels due to some toxic products. The condition has also been thought to be of a tuberculous or tuberculo-allergic nature.

A CASE OF STRANGULATED HERNIA

By A. F. W. DA COSTA, F.R.C.S.E., D.T.M., L.M.S., V.D.

MAJOR, I.M.D.

Kamptee Road, Nagpur

Mr. H. K., aged 30 years, well built, an athlete, was admitted into the hospital for vomiting and unbearable pain in the right pubic and scrotal regions which began

at 3 a.m. the same morning. On admission the pulse was 86 per minute, temperature 98°F., respiration—21 per minute, tongue—dry and thickly coated.

The complaint about a swelling appearing and disappearing in the right pubo-inguinal and scrotal area had been of twelve years' duration. The swelling, which used to descend into the scrotum from the abdomen, appeared almost invariably after exertion in the gymnasium and occasionally used to be painful, but after rest the pain and swelling used to subside completely.

At about 2-45 a.m. on the day of his admission to hospital he had a severe fit of coughing, which brought on the swelling in the scrotum and along with it pain which gradually increased and became intense.

I examined him carefully and found the hernia to be of a direct type and irreducible and the man was in agony. The hernial swelling was of the size of a big coconut, resonant, but without a gurgle; in fact with all the signs and symptoms of a strangulation. At 1 p.m. the same day after an injection of stovaine into the spinal theca and a subcutaneous injection of 1 c.cm. adrenalin, a three-inch incision immediately above the base of Hesselbach's triangle was made and the hernial sac, which looked blackish, identified. On opening the sac a purplish black fluid welled out and a fifteen-inch-long loop of gut near the ilco-caecal valve was found to be almost gangrenous. It was rigid, purplish black, along with its mesentery which looked and felt the same. There was no visible or palpable sign of pulsation in the arteries. An enterectomy looked obvious but I tried and succeeded in resuscitating the gut, after removing the constriction, with very hot saline for fully eighty minutes. To my surprise and also that of my assistants the gut began very gradually to revive until the whole coil of intestine with its mesentery became active, excepting a patch one and a quarter inches long and three-quarter inch wide on the side of the gut and a triangular patch of mesentery about one and a half inches long and an inch and a quarter wide at its base which remained purple and hard. Further efforts to revive these patches failed, so I decided to return the coil to the abdomen with the big gangrenous patch on the bowel and mesentery, although it was against all the canons and rules of surgery.

In the evening as the general condition was bad (the abdomen was tympanitic, no flatus had been passed even with a flatus tube) I decided to administer pitressin.

I commenced giving it every four hours and applied turpentine stupes to the abdomen four-hourly. Next morning he passed urine by himself to my great satisfaction and within forty-eight hours the tympanites started diminishing and some flatus was passed through a flatus tube.

He was kept on continuous glucose 5 per cent per rectum (not glucose saline), one pint every hour for six hours and then one pint four-hourly until ten pints were administered in the twenty-four hours; glucose water alone by mouth was given for four days after the operation. This was followed by barley water and glucose-D and fruit juice (of grapes, oranges, sweet limes and pomegranates) until the end of the first week. By the end of two weeks a normal diet was allowed.

He was discharged cured on the twenty-second day after operation.

He could have been discharged on the fourteenth day without danger, but I was anxious to observe the behaviour of his intestinal mechanism. As a matter of fact, it is always wise to keep an operated hernia case in bed for three weeks. I saw him two months later when he told me he was so fit that he had already begun his gymnastics as he could not resist the temptation, despite my telling

him to go easy for three months at the very least.

Commentary.—I am of opinion that this case teaches one not to be so cautious in replacing into the abdomen intestine which has been strangulated and which has revived almost completely. In due course of time with wise and appropriate after-treatment the patches of bowel, which does not appear normal before being returned to the coeliac cavity, will ultimately recover without any untoward symptoms. [On the other hand the 'canons of surgery' are based on the long experience of many surgeons and cannot be upset by a single experience of one surgeon.—EDITOR, I. M. G.]

A CASE OF SURGICAL EMPHYSEMA*

By S. N. SEN, L.M.P.

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In February last on returning to my native village I was called in to see a patient—a breast-fed male child about four months old—with the following symptoms, namely, restlessness, œdema from the chest upwards and dyspnoea.

Previous history.—No definite history could be obtained from the parents. They stated that about ten days ago the child had cried for a whole day and night, after which the above symptoms had gradually developed. A local physician suspecting diphtheria had given an injection of the anti-serum, which however had failed to produce any improvement. On thorough examination of the child, I came to the conclusion that it could not be a case of diphtheria. There was no patch, congestion nor œdema inside the throat; salivation was absent; there was no difficulty in swallowing or sucking; the expression was anxious, respiration hurried and there was movement of the alae nasi. On palpation the liver was felt rather more than an inch below the right costal arch; the spleen was not enlarged. On the right side from the head down to the chest emphysema could be noted under the skin; this was particularly noticeable over a spot between the sixth and seventh ribs which was tender to pressure. The abdomen was slightly tympanitic and a slight degree of emphysema was present over the upper right quadrant. The knee jerks were normal, the pulse was 90 per minute, tension fair, respiration—60 per minute and shallow; the temperature was 97.8°F. and never exceeded 98°F.

From the emphysema and pain it struck me that there must be some injury to the lungs. I enquired thoroughly to find out if the child had had a fall or any injury to the chest; this however was denied until finally an old woman attendant admitted that the child had accidentally fallen over a verandah about ten days previously. This fact had been suppressed as her negligence was responsible for the accident.

No medicine was prescribed for internal use except a few drops of brandy every four hours. The œdematous parts were bandaged and after two days the emphysema commenced to disappear. The child recovered completely a fortnight later.

A history of a fall from a height, the presence of emphysema, the negative signs of diphtheria and the failure to respond to the anti-serum proved clearly that the symptoms could not be due to that disease. It was purely a case of injury to the lungs following a fracture of the ribs although no signs of fracture could be

detected. The œdema was probably secondary to the emphysema.

A CASE OF ABSCESS OF THE SPLEEN IN MALARIA

By N. S. PILLAI, L.M.P.

Sub-Assistant Surgeon, Civil Hospital, Kyauktan
Burma

MA K. S., a Burmese female, thirty-nine years of age, was admitted to the Civil Hospital, Kyauktan, on the 12th March, 1934, suffering from an attack of fever with chills of twenty days' duration. She hailed from one of the villages of this township which was heavily infected with malaria. Her anæmic and emaciated condition showed that she must have been suffering for a longer period than she was aware of. Benign tertian parasites were found in the blood. The spleen which was enlarged (two finger-breadths) was bulging below the costal margin; the anterior margin was rounded and the notch was obliterated. The organ was freely movable, heavy, tense and gave a feeling of fluid contents. Although deep-seated pain was complained of there was no tenderness over the spleen. Under a course of quinine treatment her temperature became normal after six days. The condition of the spleen remained the same although the pain was said to have been slightly relieved. She was discharged from the hospital on the 31st March with instructions to come back if the splenic swelling increased or grew painful. Accordingly she came back on the 14th April with fever complaining of increased pain in, and swelling of the spleen. On examination it was found to have grown larger in size extending three inches inwards and downwards. It was immovable and the skin over the part was stretched, hyperæmic and œdematous, showing that adhesions had formed. It was thereupon decided to open it. The swelling was first explored with a hypodermic needle when pus was found. Under novocain adrenalin infiltration, a vertical incision one and a half inches long was made over the area just below the costal margin in the anterior axillary line dividing the skin and muscles and the swelling was opened with the blades of a sinus forceps. Nearly a pint and a half of thick dusky-white pus of a peculiar odour (not that of *Bacillus coli* infection) was evacuated without exerting much pressure. A rubber tube four inches long was introduced into the abscess cavity and stitched to the skin. The skin incision was closed above and below. The patient was immediately relieved of the pain and her temperature which was 101°F. on admission came down to normal on the fourth day. The abscess drained well and the cavity rapidly closed up. The patient began to move about on the tenth day. She had, however, another attack of fever with chills on the 6th May and again benign tertian parasites were demonstrable in her blood. Another course of quinine treatment was given. The fever lasted only one day. Thereafter, the patient improved steadily in health and her weight increased. She was discharged from the hospital completely cured on the 20th May. I saw her again on the 12th June. She looked quite well and cheerful. The spleen was felt just below the costal margin and was fairly movable. The anterior margin was thickened and the notch was not felt.

The inflammatory enlargement of the spleen being a marked feature in malaria, may it not safely be assumed that malaria was the cause in this case of the enlargement and suppuration which is one of the usual terminations of all inflammatory phenomena? I regret very much that I did not take a smear of the pus as soon as the abscess was opened and thus valuable

* Rearranged by Editor.

information that could have been gained was lost. Subsequent examinations were not useful as the wound became contaminated.

[Note.—It can hardly be assumed that malaria was the cause of the suppuration. It is much more likely that some infection, possibly pyogenic, was lying latent in the spleen to become active when conditions were favourable for it, i.e., during an attack of malaria.—*EDITOR, I.M.G.*]

TREATMENT OF ACUTE BACILLARY DYSENTERY WITH ANTI-DYSENTERIC SERUM AND BACTERIOPHAGE

By DHIRAJ MOHAN ROY, M.B.

District Medical Officer, Nepalgunj

ON the morning of the 16th May, 1934, I was called in to see a Hindu girl, aged 11 years, who was suffering from a sudden attack of dysentery of about twenty-four hours' duration. Her temperature was 100°F. I gave her a saline mixture containing sodium sulphate and magnesium sulphate.

When I went to see her in the evening, she had had thirty motions during the day, and her temperature was 101°F. She was given half a grain of emetine subcutaneously. Next morning her condition was no better, and another half grain of emetine was administered. In the evening I found her condition the same as before and the motions were just as frequent.

As there was no improvement whatsoever from the emetine given I thought it to be a case of bacillary type and, although there was no laboratory help available, I ordered a supply of anti-dysenteric serum and bacteriophage. As a temporary expedient I gave her an injection of kurchinatum which is claimed to act both in amoebic and bacillary dysenteries.

On the morning of the third day the specific remedies for bacillary dysentery arrived and I gave her 10 c.cm. of the polyvalent anti-dysenteric serum intramuscularly and one ampoule of the bacteriophage by mouth. In the evening 10 c.cm. of the serum was repeated and one ampoule of the bacteriophage. The saline mixture was continued as usual. On the morning of the fourth day I found the patient a little relieved but there was no marked improvement. Ten c.cm. of the serum was injected morning and evening and one ampoule of bacteriophage given thrice daily. On the morning of the fifth day there was a marked improvement and the number of motions in twenty-four hours were reduced to half. Ten c.cm. of the serum and the bacteriophage was repeated morning and evening on that day. On the morning of the sixth day there was a further improvement in the patient's condition. She had had ten to twelve motions in twenty-four hours, although mucus and blood still persisted and no natural stool was passed in any of the motions. As the patient was very young and unable to bear the pain of injections any more, I gave her 25 c.cm. of the serum along with the bacteriophage as usual, thrice daily by mouth. On the morning of the seventh day she began to pass stools with some of the motions, although there were still traces of mucus and blood.

After a total injection of 85 c.cm. of polyvalent anti-dysenteric serum and twelve ampoules of dysentery bacteriophage by mouth her condition was well under control. The specific treatment was then discontinued and bismuth mixture given. After taking bismuth for two or three days she began to pass normal stools and made an uneventful recovery.

One unusual feature of the case was that she had no tenesmus throughout her illness, which is so constant a symptom of all dysenteries.

The first part of the treatment given, namely, emetine and kurchinatum, will be criticized by some as it was mere guess work without being definite about the type of infection. In the mofussil where one cannot get laboratory help one has to take recourse to such intermediary methods such as emetine hypodermically and saline by mouth, at least as a therapeutic test similar to quinine in kala-azar.

I am indebted to Dr. S. K. Sen, M.D., chief medical officer, Nepal, for his kind permission to publish this case note.

DIPHTHERITIC CONJUNCTIVITIS

(A REPORT OF TWO CASES)

By V. C. RAMBO, M.D., F.A.C.S.

*Mungeli Area Christian Hospital and Dispensaries
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EVEN in areas in which epidemics occur diphtheritic conjunctivitis is not a common occurrence. For this reason two cases diagnosed as diphtheria of the conjunctiva, which came to the Mungeli Area Christian Hospital for treatment, are presented. The first case is presented by the courtesy of Dr. T. P. Tiwari, assistant medical officer, Mungeli, who referred the case to me for treatment and gave me the notes on the preadmission history of the child. Before reporting these cases a brief mention of some of the characteristics of this condition will be made along with some quotations from Fuchs' textbook.

Conjunctivitis diphtheritica is one manifestation of infection with Klebs-Loeffler bacilli.



Case 2—Diphtheritic conjunctivitis.

Fuchs divides this form of conjunctivitis into two forms, (a) superficial, in which the grey white membrane clings to the conjunctiva but which can be removed, (b) deep (conjunctival diphtheria in the strict sense), in which the lids are swollen, red, hot and tender. The exudate

within the tissues of the conjunctiva are coagulated, the vessels are compressed, the mucous membrane becomes stiff and devoid of blood and falls a prey to necrosis.

Von Graefe distinguishes two types, 'In the milder cases one finds the diphtheritic spots in the conjunctiva in the shape of larger and smaller islands' (especially in the lid conjunctiva) between which less diseased portions of the conjunctiva lie. In the severe cases on the other hand the diphtheritic areas rapidly run together so that the entire conjunctiva is stiff and empty of blood'. Other cases are abortive and still others are very mild ones in which there is simple catarrhal inflammation only.

In the differential diagnosis various false-membrane-producing conditions must be taken into consideration. These may be either chemical or parasitic. Gentle brushing with ammonium or silver nitrate will cause a conjunctiva to present a light membrane while prolonged contact will produce a severe deep necrosis and deep membrane. Gonococci, streptococci, and certain bacilli may alone cause a membranous conjunctivitis or may make a diphtheria bacilli infection very much worse. In certain severe cases the accompanying streptococcal infection may present any number of streptococci in a smear, hiding the diphtheria bacilli, which may not be found, but still cause their characteristic symptoms and signs.

It can often be established that the children who suffer from a conjunctival diphtheria have been associated with others who shortly afterwards come down with pharyngeal diphtheria. The disposition to diphtheria decreases with age. Adults are only exceptionally attacked by this disease and then usually it is of a much milder type.

Case 1.—A child, two years of age, while being treated for a hopelessly advanced cirrhosis of the liver suddenly developed one morning swelling of the right eyelids. The palpebral conjunctiva was injected and there was a considerable amount of laceration. The case was taken for one of catarrhal conjunctivitis and protargol drops were ordered after irrigation with warm boracic solution. Next morning the eyelids were found sticking to each other. After separating them, the conjunctiva was examined and found to be covered with a thin greyish-white membrane. Diphtheritic conjunctivitis was thought of and a smear was taken for microscopic examination. This examination showed various cocci and bacilli but failed to reveal anything like a diphtheria bacillus, and therefore no serum was administered. Irrigation with mercury perchloride 1/6000 was performed and a light application with a weak solution of silver nitrate was made. The condition of the eye on the third day was still worse. The eyelids were much swollen. The membranous deposit over the bulbous and palpebral conjunctiva so glued the bulbar and palpebral surfaces together that it was with difficulty that the conjunctival sac could be exposed and bleeding took place when separation was attempted. The cornea was unaffected, except for slight dryness and oedema. Diphtheria was again thought of but negative findings from the smear led us to think of an acute sloughing condition in a debilitated child who had been on a vitamin-deficient patented cereal food diet for months. No anti-diphtheritic serum was

given. All attempts to check the conjunctivitis, to dissolve the membrane or to keep the lids from sticking together by introducing cod-liver oil failed. The general condition was critical before the inflammation of the eye and was more so now. During the fourth night the child commenced having uncontrollable bleeding from the bowels and died an hour later, the diagnosis of the eye condition still being doubtful. Within a fortnight the diagnosis of diphtheritic conjunctivitis came to be regarded as a certainty when a second child in the same house, an elder brother, developed a typical diphtheritic membrane on the fauces and tonsils which showed positive microscopic finding. Serum treatment was given immediately with the usual successful result.

Case 2.—A young villager from Bhulan named Udhwa, aged 24, was admitted to the outpatient department on the 12th March, 1934, complaining of pain and inability to close his left eye.

The patient stated he was well until about three weeks ago when he developed a very severe headache and slight fever for two days. Both fever and headache became better but he started vomiting. He would eat twice a day and invariably vomit soon afterwards. Ten days after the beginning of symptoms, on the 22nd March, 1934, the patient developed some irritation and redness in the left eye. This increased rapidly and a white membrane appeared on the left lower swollen eyelids. The headache continued to the present time although there had been no further fever. Vomiting stopped altogether on the 9th March, three days before admission.

Patient had walked in from his village 14 miles away from Mungeli. He was in good condition. The temperature and pulse were normal. The heart showed no abnormality.

The left lower lid was seen to be everted, an ectropion being present. The everted mucous membrane was covered with a thick membrane, which was grey and surrounded by an area of congestion and hyperæmia. The membrane consisted of a tenacious necrotic slough which could not be removed. The whole remaining conjunctiva was much swollen and red. When an attempt was made at closing the lids the upper eyelid came down striking the membrane of the everted lower one. The cornea was oedematous. The iris was clear. The pupil was moderately contracted and equal to its fellow.

The right eye presented no abnormality whatever.

A smear from the membrane was positive for diphtheria bacilli. Many typical clumps were present.

A smear from the throat was also positive though no membrane whatever was present.

The patient was advised to stay in our isolation ward but this was refused. All treatment was given as a dispensary case.

Treatment.—The patient was given two injections of 5,000 units and three of 2,500 units of antiserum over a period of eight days when the smear became negative. The membranous part of the eye was painted with 1-8,000 mercury perchloride along with drops of zinc sulphate ($\frac{1}{2}$ per cent) and boric acid (3 per cent). The patient was recommended to come into the hospital as his pulse and general condition were not improving. He declined however and returned to his home.

A report has just been received which states that the patient has completely recovered without any traces of scarring or deformity being present. It is considered that a larger number of antitoxic units should have been given.

ENTIRE ABSENCE OF THE UTERUS

By A. F. W. DA COSTA, F.R.C.S.E., D.T.M., L.M.S., V.D.

MAJOR, I.M.D.

Kamptee Road, Nagpur

Mrs. P. S., aged 31 years, a Kayasth by caste, and a resident of Bihar, came under my observation in

August 1934 for trachoma. Her height is five feet one and a half inches and weight ten stones and two pounds, which indicates that she is well built, quite robust, and in good health.

She had never menstruated in her life and was anxious to have something done for her as she was frantically desirous of having a baby, *i.e.*, she was suffering from primary amenorrhœa and that is how the patient was referred to me.

About eight years ago she was in a mission hospital where, she says, under general anaesthesia, she was subjected to a vaginal operation. Nothing however resulted from this operation.

On the 8th August, 1934, I put her on a gynaecological table, made a per vaginam examination and found no sign of even a rudimentary uterus. One could just feel a roughish dimple which I suspect is the scar of the operation which (probably in search of a uterus) she states she submitted to in the Mission hospital, but it is just possible that it might be the position of the absent uterus represented by a rough dimple or depression.

On exposing the external genitalia, one was struck with the entire absence of hair on the pubis, round about the vulva, perineum and anus. The thighs and other parts were quite smooth, and her breasts were well developed but pendulous.

On introducing a duckbill speculum and exposing the vaginal cavity with an elevator the only thing that could be noticed was the dimple I have referred to above. A rudimentary uterus is not an uncommon finding, but the absolute absence of a uterus is rare. The labia and urinary meatus seemed normal, but the vaginal cavity was about one-third the normal size, the remainder with the uterus being absent.

The ovaries and tubes were not palpable, but in a healthy person they usually are hardly perceptible to the fingers. As the patient was of a heavy build, delicate palpation was not easy.

No satisfactory explanation can be given for this abnormality.

FAMILIAL PERIODIC PARALYSIS

By MOHD. YOUSAF KHAN, L.S.M.F.

Sub-Assistant Surgeon, In-charge, Laboratory and Anaesthetist, Civil Hospital, Mullan

AN interesting case of familial periodic paralysis came under my care quite recently and incidentally illustrated the hereditary nature of the disease. As the condition is so rare, a résumé of the main features of the disease may be given.

The disease is seldom seen; only 200 cases have been reported so far. It is characterized by a temporary flaccid paralysis of the muscles of the extremities and trunk with a loss of the deep reflexes and diminished or lost faradic excitability. The paralysis may pass off rapidly or slowly. It is a familial disease—usually confined to males, appearing at puberty and diminishing in frequency after middle age. Pathological observation has so far revealed no cause of the disease. It is considered by some to be a metabolic auto-intoxication.

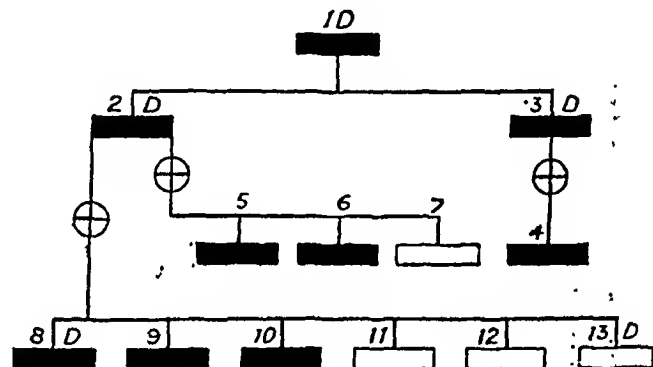
History of the case.—The patient, a Mahomedan youth, 21 years of age, belonging to the Khichi Rajput agricultural type, came to me on account of his condition. His first attack came on four years ago, when he awoke one morning, unable to move his limbs.

The organs of speech, respiration, deglutition, and excretion were unaffected. The attack lasted two hours and there were no after effects. The patient was not alarmed by his condition, as he had seen his elder brother similarly affected two years previously. Since that date he has had several attacks of varying duration and severity. The exciting cause was attributed sometimes to a rich meat meal, eating of sweetmeats and exposure to cold. The attack usually came on on waking from sleep. The patient is of good physique and there is no sign of other hereditary disease. The patient has never suffered from venereal disease.

Treatment.—Various drugs, allopathic and non-allopathic, have been tried without avail. This spring he had an attack of malaria and was treated with quinine by a colleague. This appeared to diminish the frequency but not the severity of the attacks. At present he is on moderate doses of potassium citrate and kept under observation.

Below is a diagram of the family tree with analysis:—

1. Father of Allah Bux Khan (no. 2) and Allah Ditta Khan (no. 3): was not affected; is dead; name, age, cause of death unknown.
2. Allah Bux Khan: suffered; is dead; did not die of this disease; none of his sons or daughters suffered.
3. Allah Ditta Khan (60 years): son of no. 1; suffered; is dead; did not die of this disease; none of his sons or daughters suffered.



- Male affected.
- Male not affected.
- ⊕ Daughter not affected.
- D. Dead.

4. Ghulam Mohd: daughter's son of Allah Ditta Khan (no. 3); suffered from 17 years to 45; is alive; none of his sons or daughters suffered.

5. Mohd Khan, 24 years (widower).
6. Nur Mohamad Khan, 21 years (unmarried).
daughter's sons of Allah Bux Khan (no. 2); both suffer since the age of 17 years.

7. Hashim Khan, 12 years, brother of nos. 5 and 6; so far not affected.

Sisters of nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13: not affected yet.

8. Fir Bux: died at 25 years of age; suffered from 18 to 25 years.

9. Ahmad Khan, 22 years; suffering from 17 years of age.

10. Allah Ditta, 20 years; suffering from the age of 18 years.

11 and 12. Mohd Yar, 14 years, and Ramzan, 12 years; not yet affected.

13. Ilahi Bux: died at 7 years of age; not suffered.

Conclusions

1. No deaths have been recorded as due to this disease.

2. The disease is confined to the male sex and is transmitted through the female.
 3. The disease appears at puberty and declines or disappears at about 50 years of age.
 4. The sons of those affected do not suffer.
 5. The daughters of those affected do not suffer but they convey it to their male offspring.
 6. The sisters of those affected do not suffer.
- No form of treatment has as yet been found to have any influence on the condition.

A FATAL CASE OF BRONCHIAL ASTHMA*

By FRANCISO DIAS

Casa Cirurgica, Dramapur, South Goa

S. F., an Indian male, 37 years of age, a clerk in British Africa, consulted me on the 3rd January, 1934, on account of a mild attack of influenza. He had previously had an attack of asthma in 1918 which however had lasted only a few hours and was relieved by a brisk purge. In September 1933, he had an attack of acute bronchitis, during which he suffered from a transient bout of asthma. Later on the patient suffered from dyspepsia and spent three months in a tuberculosis sanatorium as a suspect case. Neither x-ray plates nor an examination of the sputum showed any indication of tuberculosis. He was treated there for asthma with autogenous vaccines made from his sputum. He then returned home feeling quite fit.

The patient consulted me on the 3rd January, 1934, and was treated for bronchitis. On the evening of the 8th January he had a paroxysm of asthma. The usual antispasmodics along with ephedrine and adrenalin were given without avail. On the evening of the 11th in view of its continued recurrence a dose of morphia and atropine was injected. This eased the attack and procured some rest but resulted in oliguria.

The status lymphaticus reappeared on the 12th, the pulse was 130 per minute. Blood pressure—135 to 90, the urine was scanty and albumin was absent. Pituitrin and adrenalin were given to relieve the condition. On the 16th January the asthma had diminished somewhat although the patient complained of exhaustion. Shortly afterwards while changing his dress he was overcome by a paroxysm and died. The post-mortem appearance of the face was that of congestion and cyanosis.

PASSIVE COLLAPSE OF LUNG DUE TO SPONTANEOUS PNEUMOTHORAX

By A. N. DUGGAL, M.R.C.P. (Lond.), D.T.M. & H., D.P.H.
CAPTAIN, I.M.S.

and

J. R. DOGRA, M.D.
CAPTAIN, I.M.S.

A SEPOY, aged 20, admitted on 24th May, 1934, complaining of fever, cough and headache—duration one day.

Patient had no previous illness except a minor injury in the epigastrium a year ago from which he recovered and had been on full duty since.

The patient at the time of admission was tall, thin, with bright eyes and long eyelashes. Physical examination revealed nothing abnormal except a few scattered râles in both lungs. Blood examination showed normal white blood cell and differential counts. Urine normal. The nature of the temperature led to various laboratory examinations for malaria,

enteric, Malta and typhus-like fevers. These tests were negative, thus excluding the above conditions. The Wassermann reaction was negative. Repeated examination of sputum (direct smears, antiformin method and guinea-pig inoculation) showed absence of *B. tuberculosis*. The fever and cough continued for one month while symptomatic treatment was given. On 22nd June, 1934, the patient complained of severe dyspnoea, incessant cough with a large amount of purulent sputum. Physical examination then revealed deficient air entry into the right lung without any change in percussion and vocal resonance; distant bronchial breath sounds with few râles were audible in the right interscapular region. There were no physical signs suggestive of a cavity. Skiagram (a) showed presence of pneumothorax in the right chest with extensive consolidation of entire lung and suggestion of a cavity at the apex.

The temperature remained continuous thereafter with profuse expectoration which was blood-stained at times.



Skiagram (a). Shows right-sided pneumothorax, with consolidated lung and a cavity at the apex.



Skiagram (b). Shows presence of fluid in the right side in addition to (a).

On 1st July, 1934, typical signs of 'open' pneumothorax, i.e., tympanitic note, ringing-coin percussion, amphoric breathing, metallic and tinkling consonances developed. The apex beat of the heart was in its normal position. The patient's condition got worse with marked toxæmia and emaciation. The skiagram (b) now showed presence of fluid in the right chest.

* Rearranged by Editor.

Five ounces of serous fluid was aspirated. Examination showed absence of *B. tuberculosis* and other organisms with lymphocytes and a few polymorphonuclears. Patient died on 4th July, 1934.

Unfortunately a post-mortem examination could not be arranged.

Points of interest

1. Spontaneous pneumothorax was obviously due to the rupture of a cavity in the right apex. Its location and the age of the patient are suggestive of its being tuberculous in nature.

2. Pneumothorax started as one of 'closed type' with complete consolidation of collapsed lung, later becoming one of the 'open type'.

3. Physical signs of the cavity were masked by the presence of pneumothorax and entire consolidation of the lung.

4. Sputum and pleural fluid showed absence of tubercle bacilli.

5. Apex beat showed no alteration in position; this was possibly due to a fixed mediastinum.

We wish to thank Lieut.-Colonel J. F. James, I.M.S., Officer Commanding, C. I. M. Hospital, Razmak, for his advice and permission to make use of the notes and skiagrams.

A LARGE OVARIAN CYST

By S S HAYARE, MB, BS.

Chief Medical Officer, The Good-Fellow Hospital
Palanpur (N. G.), India.

A PATIENT, S R, about 35 years of age, came to this hospital on the 20th July, 1934, on account of a huge tense abdominal swelling. Although she weighed 160 pounds, her face and extremities were emaciated; otherwise her condition was fairly good. She had given birth to two children in her early married life and



Ovarian cyst

Fig 1—S R, before operation

thereafter the abdomen commenced to enlarge over a period of fifteen years. After a thorough investigation of the case it was decided to be an ovarian cyst of the right side. She was operated on on the 21st July and 60 pounds of a thick glairy fluid was withdrawn by tapping. The remainder of the fluid and the cyst itself were then removed. The total weight of the cyst and contents was 80 pounds. After the operation the

patient was put on nourishing diet and tonics. She was discharged cured on the 19th August. The outstanding features of the case were, the size of the cyst, its duration (15 years) and the vitality of the patient



Ovarian cyst

Fig 2—S R after operation

in withstanding the shock of the operation. The photographs of the patient before and after operation illustrate more vividly her condition.

DELIRIUM AFTER QUININE ADMINISTRATION

By JAGADISH CHANDRA DUTTA, L.M.P.

Rajah Ali Tea Estates, Hoogrijan P. O., Assam

A PATIENT named Jatiram, aged 25 years, was admitted into this hospital with hyperpyrexia. The temperature was 105.4°F. The liver and spleen enlarged; bowels not constipated; heart regular. The patient had no other complaint except high fever. No cerebral symptoms, not even a headache during the fever since his admission. I applied a cold compress to the head and sponged the whole body with cold water. I gave him a diaphoretic mixture every two hours and, after taking six doses, his temperature came to 100.2°F. I now tried quinine five grains with liquor arsenicalis. After taking the quinine he suddenly became delirious and unconscious with severe dyspnoea. He had no chest complaint and had no history of rheumatism. There was no remission of temperature after taking the quinine. I now tried a diaphoretic mixture with bromide. After taking four doses, all the severe symptoms disappeared and the temperature came down to 99.6°F. I now again tried quinine in small doses (two grains). After half an hour the patient was attacked with the same symptoms. This time he vomited a lot of bile mixed with mucus and was very restless. By this time his condition rather alarmed me. I again tried diaphoretic mixture with bromides. After taking six doses his symptoms cleared up and the temperature came down to 99°F. After eight doses his temperature came to normal, 98.4°F. I continued the mixture every four hours for three days and the case was discharged quite fit and well. I did not again administer quinine. It is remarkable that the patient could not bear even small doses of quinine although suffering from hyperpyrexia with enlarged spleen and liver; the diaphoretic apparently alleviated the more urgent symptoms.

I am grateful to my medical officer, Lieutenant-Colonel F. J. Palmer, for his kind permission to publish this case.

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THE TOXICITY OF ATEBRIN

THE reception accorded by the medical profession, and to a less extent by the general public, to any new specific seems to be governed by an unalterable law; there are three distinct stages in this reception—the stage of acclamation when it is hailed as the *therapia magna sterilans* and as the last word in the treatment of the disease in which it is used, the stage of abuse when, rightly or wrongly, it is compared disadvantageously with older, established forms of treatment and unfavourable by-effects are attributed to it, and finally the stage when its limitations are defined and it either takes its place in the pharmacopœias of the world or is discarded.

The frailty of human nature and a tendency to exaggerate are undoubtedly responsible to some extent for the sharp contrast between the first and second stages, but it is not necessary to emphasize these, as the whole process is as natural as the swing of the pendulum. We will take salvarsan as an example. One heard practically nothing of its 605 unsuccessful predecessors; naturally, nobody was going to write detailed articles reporting that they had tried a new drug for syphilis which was not very successful and was on the other hand rather toxic; even if they had, no editor of a medical paper would have published them. The information gained by such trials is of scientific value and should be recorded somewhere, but it has no 'news-value', as nine hundred and ninety-nine out of every thousand of the readers of the journal will never have heard of the substance. First reports must therefore necessarily be good reports. Other people use the drug and writers vie with one another in reporting larger series of cases, and better and better results, until all that is good has been said about the drug, and to praise it further is plagiarism. Then the sceptics have their chance; they may have come into the field rather late, they have read the early reports, perhaps not too critically, and have obtained an exaggerated idea of the value of the drug; they are disappointed in the results that they obtain, and they say so, emphasizing the shortcomings of the drug rather than its qualities; others follow suit. But we need not follow this hypothetical case any further.

Atebrin is at present in the process of going through these stages. It is, we imagine, now coming to the end of the second stage. It has been subjected to a very considerable amount of criticism during the last year, and is on the

whole coming out of it remarkably well. We propose to confine the present discussion to the question of its toxicity.

Toxicity is a relative term; one cannot just say that a drug is toxic, or not toxic. There are two qualifiable factors concerned, the drug and the patient. It is obvious to everybody that, whereas one grain of a drug may be non-toxic, it is quite possible that ten grains may be very toxic indeed, but it is perhaps not so fully realized that individual susceptibility is liable, in the case of certain drugs, to a ten-fold variation; that is to say the maximum tolerated dose may be ten times as great as the minimum lethal dose. The toxicity of a drug should therefore be expressed as a curve, with the doses as the ordinates and the percentages of individuals of a given population showing toxic symptoms, as the abscissæ, but in order to draw this curve a very considerable experience with a drug is necessary. We are now approaching the time when the combined experience of a number of workers has given us sufficient data to draw such a curve with reference to atebtrin. We do not propose to do this, nor to review the literature on the subject, which is now considerable; there are however in this number three papers in which the subject of the toxicity of atebtrin is introduced and in one of these the subject is discussed at some length.

Williams and Bhattacharyya gave preventive courses consisting of one gramme of atebtrin spread over five days (to adults and proportionate dosage to children) to each of 234 tea-garden coolies, and later they administered fifty treatment courses corresponding to a total adult dosage of 1.5 grammes of atebtrin spread over five days to those individuals who developed malaria; they summarize their experience in the words 'ill-effects were very few and not at all dangerous'; these ill-effects consisted of yellow discoloration of the skin in three cases, giddiness in three, slight abdominal pains in one, and anorexia in one. These writers distinguish between the ill-effects caused by atebtrin and those caused by plasmochin; although in every case the course of atebtrin was followed by one of plasmochin, only two patients complained of abdominal pain during the latter course.

Newman and Chalam adopted two separate plans of treatment; in one the course of plasmochin followed the course of atebtrin, and in the other the drugs were given together. They do not attempt to distinguish between the ill-effects caused by atebtrin and those caused by plasmochin; the course of atebtrin consisted of an adult dosage of 1.5 grammes spread over five days and that of plasmochin of 0.15 gramme similarly spaced; of the 258 persons that received the drugs separately, ill-effects were reported in 15—slight discoloration of the skin and gastric pains in five and seven, respectively,

and in three severe gastric pains and yellow pigmentation of the skin. They remark 'that none of these symptoms was of any consequence'.

There is a very close parallelism between these two reports; in the first, by-effects are noted in 10 out of 248 treatments and in the second in 15 out of 258. In the former a slightly lower dosage was administered to the majority of the patients and this may be taken to account for the lower incidence of by-effects, but considering the two series together one concludes that unimportant by-effects may be expected in about five per cent of persons to whom the usual course of atebirin followed by one of plasmochin is given.

On the other hand, the experience of Newman and Chalam with the combined administration of atebirin and plasmochin does seem to indicate that one enhances the toxicity of the other, as, when the two drugs were given together to seventy-six persons, sixteen of these exhibited untoward symptoms; in one case there was 'severe gastric pain, vomiting and slight collapse'.

Chopra and Chaudhury have reported eleven cases in which very definite and temporarily-serious symptoms have followed the use of plasmochin, or atebirin and p. smochin. The majority of the patients in this series either had taken these drugs on their own initiative without any medical advice, or had in the first place been advised by their doctor to take them and had then continued to do so without following his advice regarding dosage, but we are afraid that there were other instances in which it was quite obvious that the medical man in attendance had a very incomplete appreciation of the action and knew nothing of the dangers of the promiscuous administration of these two drugs. These two writers also suggest that atebirin may have some influence in increasing the toxicity of plasmochin.

Green reporting his experience in Malaya said that there had been no complaints in a series of 600 rubber-estate coolies receiving the 'usual' course of atebirin, a maximum total dose of 1.5 grammes, that by-effects, mostly mild, were noted in 10 per cent of hospital patients receiving a seven-day course (2.1 grammes in adults) and that seven out of twenty patients taking a more intensive course of 2.8 grammes over a period of seven days showed by-effects.

The commonest by-effect of atebirin administration is yellow discoloration of the skin and conjunctiva, and though it is the least important of the by-effects it has given rise to more misunderstanding than any of them. Patients themselves, unless they have been warned, very naturally associate this yellow discoloration with jaundice, but it is surprising that a large number of medical men also entertain this misconception, and we have

repeatedly heard references made to the toxic action of atebirin on the liver; there is, as far as we know, no evidence that atebirin has any such toxic action. One point that seems to give rise to suspicion is that this yellow discoloration is only noted occasionally and that when it does occur it is sometimes accompanied by other symptoms. The assumption is that the yellow discoloration is more noticeable in those patients who are not excreting the drug as rapidly as the normal person; probably therefore it is in these people that other by-effects would most commonly occur. If this is the case, then the yellow discoloration should prove a valuable danger signal, suggesting that the drug must not be continued beyond the usual dosage, and, if we are going to attribute any interaction between the two drugs (and evidence in this connection is accumulating), that plasmochin should be withheld, for a time at any rate.

Other by-effects that have been attributed to atebirin are hæmoglobinuria, gastric pains, headache, anorexia, mental depression and excitation and in some cases even temporary psychoses. Nearly all the by-effects reported have been of a temporary nature and few have been serious. In the case of the more serious ones, *e.g.*, hæmoglobinuria, closer investigation has nearly always shown that plasmochin was also being administered.

When a new drug is being used there is a tendency to attribute to the ill-effects of this drug any deviation from the ordinary course of the disease, and, in the case of the inexperienced worker, even the normal symptoms of the disease; in many instances the so-called ill-effects of atebirin can be accounted for, thus, but it is, of course, possible that certain persons will show an idiosyncrasy towards it, and the few cases of mental disturbance that have been reported from Malaya, where this drug has been used very extensively, may be examples of this personal idiosyncrasy. This is a question that time and further experience will answer, but, in view of the smallness of the number of such instances in the very considerable experience that has been accumulating during the last four years, we may conclude that the more serious by-effects of atebirin are very rare.

Another problem that is awaiting solution is whether or not atebirin and plasmochin given together, or within a short space of time, produce more by-effects than each drug given separately. There is a considerable amount of clinical evidence to show that combining the drugs does increase their toxicity, though it is not conclusive, and it is quite possible that an innocuous combined course may yet be devised. Further, it should be remembered that as yet there is little evidence to show that plasmochin enhances, to any marked extent, atebirin's action on the schizonts of any of the

plasmodia. Therefore the addition of plasmo-chin will not accelerate the patient's recovery, nor reduce the chances of a relapse, and only in special circumstances is it necessary to give it.

We may conclude by saying that accumulated experience suggests that atabrin, in the ordinary

curative dosage of 0.1 gramme three times a day for five days (for adults and proportionately for children), will not cause serious symptoms in—shall we say—one in every thousand individuals to whom it is given, but that a small percentage—from one to five—of persons will experience unimportant by-effects.

Commentaries

[Under this heading we propose to publish, from time to time, commentaries and detailed reviews of important reports, books and papers, sent to us by contributors.

Colonel Stott's is an example of the type of contribution that we hope to publish: next month a review of *Recent Advances in Ophthalmology*, by Lieutenant-Colonel R. E. Wright, C.I.E., I.M.S., Superintendent, Ophthalmology Hospital, Madras, will appear in this section.

We wish to draw the attention of principals of teaching institutions in India to the educative value of such contributions, with the hope that they will send us similar commentaries.—EDITOR, I. M. G.I

THE ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION'S CLASSIFICATION OF MENTAL DISORDERS

ABILITY to classify clearly and to define rightly forms a high road to increased knowledge of the problems to be surveyed within the range of any given subject under consideration. Classification and definition become easier in proportion to the knowledge available concerning the subject, to the specialized skill of those engaged on the work, and to the time and interest taken therein.

As regards the mental disorders, knowledge is still in the stage of evolution, wherefore, classification is unsatisfactory, and few authorities have agreed upon a provisional working scheme. The ætiological factors of mental disease are at present too ill known to provide a sound basis of classification. Symptomatology, as a localizing agent in the organ of the mind, is far less defined than in the case of other body organs. Morbid anatomy, too, provides no adequate help for although it is true that the grosser defects of the brain are revealed as yet we possess insufficiently delicate procedures with which to estimate rightly those naked-eye and histological changes which occur in mental disease. Nor has psychopathology, still in its infancy, yet provided us with sufficient data for a satisfactory classification.

It is therefore particularly fortunate that the Royal Medico-Psychological Association has presented the medical profession with a practical scheme of classification in two parts which are intended to be used in conjunction with one another.

Part I presents the actual classification, being based on clinical pictures or syndromes of

mental disorder with which all psychiatrists are familiar, whilst part II schedules those ætiological or associated factors in mental disease which are so far generally recognized.

This scheme has not been hurriedly evolved, nor by individuals without considerable practical experience of mental disease. The sub-committee responsible for it has laboured throughout four years from 1929, and consisted of no less than nineteen mental specialists. These included representatives from four London teaching hospitals, the School of Medicine for Women, the Post-graduate College, the Edinburgh and Welsh Universities, together with a commissioner of police, so that each practical aspect has been well and truly considered.

The scheme is so helpful in its ease of application, so elastic in its provision for future extension and so stimulating towards the fuller investigation of the cause of each individual case of mental disorder that it appears worthy of the widest adoption.

The two parts of the classification now follow. Thereafter a series of comments in fuller explanation of the several groups of part I is appended. The original communications were published in the *Journal of Mental Science* of April 1932 and of October 1933.

The classification is perhaps rendered of greater simplicity if the major head under 'D' of part I were described as

D—*Systematized delusional psychosis*.

(a) Paranoia, (b) Paraphrenia, instead of

D—*Psychopathic constitution and paranoia*.

(a) Pathologic constitution, (b) Paranoia; for systematized delusions, which form a readily-recognized clinical syndrome, find a convenient pigeon-hole in this group of mental disorder. Paraphrenia which is a half-way link with dementia præcox may be placed in either group, though as delusions are prominent it is perhaps better classed with paranoia. If paraphrenia is placed in the above relationship with paranoia, the paranoid type of dementia præcox in which delusions occur becomes the connecting link with group C. The several grades of paraphrenia are well described in Major Lodge-Patch's recently-published excellent *Textbook of Mental Disease* (Baillière, Tindall and Cox)

which renders this obtuse speciality understandable and indeed enjoyable alike to the student and to the practitioner of general medicine.

THE CLASSIFICATION OF MENTAL DISORDERS PART I.—CLINICAL CLASSIFICATION

(To be used in conjunction with part II, *Ætiological Factors*)

- A. *Oligophrenia* (amentia, mental deficiency).
 - (a) Idiocy.
 - (b) Imbecility.
 - (c) Feeble-mindedness (moron).
 - (d) Moral deficiency.
- B. *Neuroses and psychoneuroses*.
 - (a) Exhaustion states (including true neurasthenia).
 - (b) Anxiety states.
 - (c) Compulsions, obsessions, and phobias.
 - (d) Hysteria.
 - * (c) Mixed and other forms.
- C. *Schizophrenic psychoses*.
 - (a) Dementia præcox.
 - (i) Simple type.
 - (ii) Hebephrenic types.
 - (iii) Katatonic types.
 - (iv) Paranoid types.
 - (b) Paraphrenia.
 - * (c) Other forms.
- D. *Psychopathic constitution and paranoia*.
 - (a) Pathological constitution.
 - (b) Paranoia.
- E. *Affective psychoses*.
 - (a) Manic-depressive psychosis (cyclothymia).
 - (i) Elation.
 - (ii) Depression.
 - (iii) Stupor.
 - (b) Involution melancholia.
- *F. *Confusional states*.
- G. *Epileptic psychoses*.
- H. *General paralysis*.
- *I. *Other psychoses associated with organic brain disease*.
- *J. *Dementia*.
- *K. *Undetermined types*.

PART II.—ÆTIOLOGICAL (OR ASSOCIATED) FACTORS

- 1. *Heredity* (7).
 - * (a) Psychotic.
 - (b) Epileptic.
 - * (c) Neurotic.
 - (d) Alcoholic.
 - * (c) Various organic nervous diseases.
 - * (f) Endocrine disease.
 - (g) Tuberculous.
- 2. *Deprivation of special sense* (2).
 - (a) Sight.
 - (b) Hearing.
- 3. *Critical periods* (4).
 - (a) Puberty.
 - (b) Adolescence.
 - (c) Climacteric.
 - (d) Senility.
- 4. *Child-bearing* (3).
 - (a) Pregnancy.
 - (b) Puerperium (not septic).
 - (c) Lactation.
- 5. *Mental factors* (3).
 - (a) Previous attacks of mental disorder.
 - * (b) Sudden stress.
 - * (c) Maladjustments of
 - (i) Social life.
 - (ii) Sex life.
- 6. *Physiological disturbances* (3).
 - (a) Malnutrition.
 - (b) Privation.
 - * (c) Exhaustion.
- 7. *Trauma* (4).
 - * (a) Injuries.
 - * (b) Operations.
 - (c) Sunstroke.
 - (d) Electric shock.
- 8. *Toxic factors* (11).

A. Chemical.

- (a) Alcohol.
- * (b) Narcotic drugs.
- * (c) Mineral poisons.
- * (d) Other poisons.

B. Infective.

- (a) Syphilis.
- (i) Congenital.
- (ii) Acquired.
- (b) Puerperal fever.
- (c) Influenza.
- * (d) The specific fevers.
- (c) Tuberculosis.
- * (f) Focal sepsis.
- * (g) Other infections.

*C. Metabolic.

- *9. *Deficiency diseases*.
Pellagra, beri-beri, etc.

*10. Diseases of the nervous system.

11. Diseases of other systems (6).

- * (a) Hæmopoietic.
- * (b) Cardiovascular.
- * (c) Respiratory.
- * (d) Gastro-intestinal.
- * (e) Genito-urinary.
- * (f) Endocrine.

12. No factor ascertained.

13. No history obtained.

Notes :—

1. Where a patient is suffering from a syndrome which is not fully described by the clinical group heading in part I the complete details should be specified. For example, a case of Korsakov's syndrome should be returned as 'confusional state' (Korsakov's syndrome), and if excessive drinking was known to be the cause, the complete classification expressed in symbols, for statistical purposes, would be F. (Korsakov's syndrome), 8, A, (a).

2. The heads in part I which are likely to require further specification are marked with an asterisk (*)—and in these cases the precise ætiological factor is to be specified when known. Similarly certain headings in part II are so marked and in these cases the precise ætiological factor is to be specified when known.

3. For example, a psychosis due to cerebral tumour would appear as I., 10 (cerebral tumour); or a case of depression following influenza and with a family history of manic-depressive psychosis would appear as E., (a), (ii), 8, B, (c) and 1, (a) (manic-depressive).

COMMENTS AND EXPLANATORY

A. *Oligophrenia* (amentia, mental deficiency)

A condition of 'small' (ὀλιγος) 'minds' (φρον) from arrested or incomplete development whether arising from inherent causes, or induced by disease or injury. Etymologically 'amentia' ('absence of mind') is misleading. Amentia also was first used for 'confusional insanity', and is so used in the Norwegian, Dutch, Italian, and Viennese classifications. The term oligophrenia should therefore replace the word amentia in the sense of this classification. The definitions of the four sub-groups are those of the Mental Deficiency Acts (England) of 1913. The classification of the first three states consists in a useful grading of mental capacity, (a) 'idiots' being without intelligence and unable to protect themselves against common physical agents, (b) 'imbeciles' having rudimentary intelligence, insufficient to

manage themselves or their affairs and incapable of being taught to do so, whilst (c) the 'feeble-minded' possess yet a larger amount of intelligence but they require care, supervision and control for their protection and appear permanently incapable of receiving proper benefit from instruction in ordinary schools. Sub-group (d) *moral deficiency* corresponds to what Tredgold calls a 'moral imbecile', i.e., one who has a permanent moral defect from an early age with strong vicious or criminal propensities, and on whom punishment has had little or no deterrent effect. In all cases the defect exists from birth or from an early age.

B. The neuroses and psychoneuroses

No differentiation is made between these two conditions. Either term is preferred to the expression 'minor psychosis'.

(a) *Exhaustion states* (including neurasthenia). This should designate abnormal mental states characterized essentially by mental or motor fatigability and irritability. The word neurasthenia was rejected since its war-time use as a dumping ground for all sorts of mental disorders. Freud also uses neurasthenia in a restricted sense to signify the exhaustion following masturbation. The expression 'exhaustion states' conveys a very definite meaning, and indicates a fairly clear clinical condition.

(b) *Anxiety states*.—This group includes the symptoms commonly exhibited by generalized fear.

(c) *Compulsions, obsessions and phobias*.—Phobias have been separated from the anxiety states because of a fundamental difference between the vaguer, more indefinite and generalized fears of the latter, and the attachment of fear or anxiety to some definite object or situation in the former.

Obsessive ideas persist in intruding into consciousness whatever the patient may be thinking of. There is no conscious wish concerning the production of the obsession.

(d) *Hysteria* is a faulty reaction to environment, characterized by a variety of (1) motor symptoms, (2) sensory symptoms and (3) mental symptoms.

C. Schizophrenic psychoses

By derivation schizophrenia (gk.) means a splitting, cleavage or rending asunder of the mental functions. This syndrome includes cases which show *remissions*, and even rare *recoveries*, in addition to the classical type which results in *progressive deterioration* to profound dementia.

(a) *Dementia præcox*.—Etymologically signifies precocious (i.e., juvenile or adolescent) dementia. The will and emotions are especially affected.

There are four main clinical groups.

(i) *The simple type*.—The powers of attention of interest and of affection and of the senses gradually fail. An apathetic state or inactive vegetable existence develops, often with peculiar behaviour, but *without* expression of delusions or of hallucinations.

(ii) *The Hebephrenic group*.—Hebe was a Greek Goddess of youth. Prominent features of this group are tendencies to silly laughter, grimaces, and mannerisms with grotesque ideas and erratic behaviour.

(iii) *The Katatonic group* shows prominently a negativistic resistive attitude, which may develop into the performance of the exact opposite of any useful action suggested, but the patients become very suggestible to perform futile actions. The third symptom is stereotyped behaviour in attitude, movements or speech. A fixed rigid attitude may be assumed for hours on end.

(iv) *The paranoid group*.—Delusions (whence the name paranoid), usually of persecution or of grandeur, or hypochondriacal, together with hallucinations of the various special senses, are usual. The course tends to be rapid with early dementia; whilst the above types are classical, cases and symptoms are often mixed.

(b) *Paraphrenia* resembles both paranoid dementia præcox and paranoia. But both emotional and volitional disorder is absent or slight in paraphrenia, as compared with paranoid dementia præcox, whilst the condition progresses to dementia, as compared with the very prolonged course of paranoia, where intelligence of a high order typically remains.

(c) Other forms.

D. Psychopathic constitution (including paranoia)

(a) *Psychopathic constitution*.—This group includes a large number of pathological personalities amongst criminals, tramps, litigators, queer people, anti-this and anti-that, sex perverts, most drug addicts, mattoids, agitators, etc.—the prison psychoses.

(b) *Paranoia*.—In paranoia or delusional insanity, the delusions are of insidious development. Though different authorities describe various cases, some terminating in dementia, within the limits of this syndrome, the Royal Medico-Psychological Association considers that paranoic conditions which do not end in intellectual impairment should be separated from the schizophrenic psychoses. Hence this group is defined as showing no mental impairment, and as being without hallucinations.

E. Affective psychoses (i.e., the psychoses of the affections or emotions)

These are characterized by defect of some of the higher functions (will, attention, concentration and judgment, and by the

predominance over them of the lower level automatic associations).

(a) *Manic-depressive psychosis* (cyclothymia). (1) Elation and excitement and motor activity. (2) Depression, misery and inactivity. (3) Stupor.

(b) *Involucional melancholia*.—This group comprises the slowly developing depressions of middle life and of later years characterized by (1) worry, (2) insomnia, (3) uneasiness, and (4) agitation. The Royal Medico-Psychological Association considered that these involucional states were more allied to manic-depressive insanity than to the schizophrenic conditions. States of depression in arteriosclerosis should be included in group I.

F. Confusional states

The title is self-explanatory.

G. Epileptic psychoses

This group includes only what is known as 'essential' epilepsy with psychosis. Obviously however an epileptic may remain sane or may develop some other form of insanity such as manic-depressive psychosis. The group will undoubtedly be subdivided as knowledge progresses. Cases of organic brain disease, with seizures of any kind, are not to be included.

H. General paralysis

This forms a well-recognized group though purists may not agree with the diagnosis as sometimes made, but our knowledge is insufficiently advanced to permit of any alteration. Cases of cerebral syphilis are excluded.

I. Other psychoses associated with organic brain disease

That is other insanities with gross brain lesion, e.g., arteriosclerosis of the cerebral arteries resulting in premature senility, cerebral hæmorrhage and thrombosis and cerebral tumours. It was felt that there was no need to separate off more than the syphilitic conditions.

J. Dementia

This group does not include the dementias where the original condition is known.

K. Undetermined types

This group was retained for conditions which could not be classified under any of the divisions A to J.

H. STOTT, M.D. (Lond.), F.R.C.P.
(Lond.), D.P.H. (Eng.),
LIEUT.-COL., I.M.S.

KING GEORGE'S MEDICAL COLLEGE,
LUCKNOW.

Medical News

THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

THE following students are declared to have passed the L.T.M. Examination, Session 1934.

Passed

(Arranged in alphabetical order)

1. Dinabandhu Basu, L.M.F., Private Practitioner.
2. Sham Singh Bedi, L.S.M.F., General Duty, Mayo Hospital, Lahore, Punjab.
3. Nagendra Nath Bhadury, L.M.F., Assistant Medical Officer, Lakwah Tea Estate, Assam.
4. Sudhir Chandra Bhattacharjee, L.M.F., Private Practitioner.
5. Ramanlal Desai, L.C.P.S. (Bom.), Medical State.
6. Krishna Kishore Dutt, L.M.F., Private Practitioner.
7. Prakash Nath Ghose, L.M.F., Assistant Medical Officer, Dhullia Tea Estate, Assam.
8. Anil Kumar Ghosh, L.M.P. (Bihar and Orissa), Private Practitioner.
9. Promodendu Gupta, L.M.F., Private Practitioner.
10. Ganpaya Shambaya Kote, L.C.P. & S. (Bom.), Private Practitioner.
11. Anant Ram Luthera, L.S.M.F. (Punjab), In-charge, Canal Dispensary, Muridke, Sheikhupura.
12. Sachindra Kumer Mitra, L.M.F. (Bengal), Tongani Tea Estate, Darrang (Assam).
13. Sreepati Bhushan Nath, L.M.F., Private Practitioner.
14. Subhusamy Padmanabhan, L.M.P., Private Practitioner.

15. Kantilal Maneklal Shah, L.C.P.S. (Bom.), Private Practitioner.
16. Popatlal Chandulal Shah, L.C.P.S. (Bom.), Private Practitioner.
17. Ramanlal Ghelabbai Shah, L.C.P.S. (Bom.), Hony. S. M. S. Officer at Civil Hospital, Surat.
18. Ram Lal Sharma, L.S.M.F. (Punjab), Medical Officer, Anand Garh, Sheikhupura.
19. Budh Singh, L.S.M.F. (Punjab), Private Practitioner, Rawalpindi.
20. Pritam Singh, I.M.D., Government of India.
21. Saubhagyachandra Girjashanker Trivedi, L.C.P.S. (Bom.), Private Practitioner.

PUNJAB MEDICAL COUNCIL

THE following is an extract from the summary of the proceedings of the meeting of the Punjab Medical Council held on the 10th November, 1934.

1. Decided that a panel of members be appointed annually as visitors for the various medical examinations held in the province and the following be appointed as visitors for one year:—

- (1) Lieut.-Col. J. J. Harper-Nelson, I.M.S.
- (2) R. B. Dr. Maharaj Krishna Kapur.
- (3) Dr. Mirza Yaqub Beg.

2. The Council resumed consideration of the adjourned case of Mr. Sundar Das, L.M.P., who it was alleged had resorted to advertising his practice. He was called upon to appear before the Council personally but did not appear. The Council decided that his name should be removed from the register for a period of three years.

3. Decided that the representation of licentiates on the Punjab Medical Council should remain as it is at present.

4. Court judgments in the following cases of bogus doctors were recorded and it was ordered that in future the information of the conviction of such bogus practitioners should also be sent to the Director of Information Bureau for publication :—

A. H. Arif Asfani of Lahore, fined Rs. 150.

Offence 'indicated letters M.D. after his name'.

S. M. D. Kazim of Rewari, fined Rs. 150. Offence 'declared himself a registered medical practitioner while he was a quack'.

5. The request of the Principal, Ludhiana Medical School (a private institution for male students), asking for recognition of his school and also the report of Lieut.-Col. Amir Chand recommending that the first professional examination for the present be recognized was considered, and the Council resolved that the opinion of the legal remembrancer be sought in the matter as to which body is competent to deal with the recognition of the first professional examination of the school and the president be authorized if so advised by the legal remembrancer to appoint any member of the Council to visit the school and report.

6. Resolved that the qualification of 'Diploma in Laryngology and Otology' (granted by the Royal College of Physicians of London and the Royal College of Surgeons of England) be brought on to the schedule of 'additional qualifications'.

QUARTERLY BULLETIN OF THE HEALTH ORGANIZATION OF THE LEAGUE OF NATIONS

THE September number of the *Quarterly Bulletin* that has just appeared indicates the range of subjects which come within the purview of the Health Organization of the League of Nations.

The malariologist and the public-health worker in countries in which malaria is an important cause of morbidity will find considerable interest in a report on the efficiency of totaquina in the treatment of malaria. Totaquina, the name given to a standardized mixture of the total alkaloids of cinchona bark, can be produced at a much lower cost than the salts of quinine, which have been used almost exclusively in the past. The report, which has been prepared by William Fletcher and E. Pampana, deals with observations made in several countries; these observations indicate that there is little to choose between totaquina and the salts of quinine in so far as their efficiency in the treatment of malaria is concerned. A second article of interest to the malariologist is written by Swellengrebel and Nykamp, and contains some further observations on the bionomics of *Anopheles maculipennis* in Holland.

Senator Lindhagen, a former Mayor of Stockholm, contributes an illustrated account of the Stockholm Garden Settlements, which cannot fail to interest the many people concerned in town planning, building schemes and the question of housing generally.

A report on the standardization of vitamins gives the results of the Second Expert Conference which was held in London in June of this year. The Conference was held under the auspices of the Permanent Commission for Biological Standardization of the League's Health Organization. The question of vitamin standardization is one of considerable practical importance at the present time.

Nutrition workers will find useful material in an article entitled 'The Effects of the Economic Depression on the Population of Vienna', by Gotzl, Kornfeld and Nobel. Prolonged unemployment appears to have had deleterious effects on the physical condition of the unemployed and their families in Vienna, but the great practical difficulties, inherent in investigations of this kind, in obtaining unequivocal data are fully recognized. They are in fact, well described in the report.

LEAGUE OF NATIONS' EASTERN BUREAU: SECOND INTERNATIONAL COURSE IN MALARIOLOGY, 1935

WE have now received a notice regarding the second of the series of international malaria courses to which we referred in our last issue; this notice is reproduced below.

We anticipate that the number of applications for admission to this course will far exceed thirty—the number that will be accepted; we therefore urge upon our readers the necessity of making early applications. At the same time we would remind them that the malaria courses are not organized for private individuals anxious to add to their academic qualifications, but for practical malariologists employed by governments, municipalities, railways and commercial organizations.

At the first malaria course, India was not well represented (from a numerical standpoint only—actually, we have learnt from a private source, our candidates were amongst the most proficient), and it is obvious that her importance in the Eastern sphere entitles her to more than the three seats she occupied last year. We hope this year that the number and suitability of the applicants from this country will lead to their occupation of a much larger proportion of the seats.

It has long been a matter for comment that the Malaria Commission of the Health Committee of the League of Nations, in its enquiries into malaria, and particularly in its recommendations for the control of the disease, had not been able to take into consideration the situation in the Far Eastern countries and the experience gained there in fighting the disease. There has also been a notable gap in the international malaria courses arranged by the Health Organization in that, while such courses have been held in European countries—London, Paris, Hamburg, Rome—with practical work in Spain and Yugoslavia, it has not been possible to arrange for these courses in the East.

This was brought forcibly home to the Secretary of the Malaria Commission during his visit to Far Eastern countries in 1931-32. He found that the problem was quite different in many respects from that which confronted European administrations. Its scope and nature were much greater, the attack by anti-mosquito control was different, the economic and social conditions of the population did not resemble those of European countries, nor was the system of health administration the same. As a result of such differences malariologists trained in Europe, when they come to take up duty in Eastern countries, are not acquainted with the technique nor fully equipped with that local knowledge of the problem which is essential if it is to be controlled. On the other hand, it has been impracticable for medical officers engaged in work in the East to be spared for the time necessary to attend international malaria courses in Europe, even if the cost of travel did not form a bar.

This need for international training and exchange of experience is very clearly indicated in malaria because of the essentially local character of the problem. This means that expert knowledge of the subject can only be obtained by a study of its effects in several countries. The League, in approving the proposal to organize international malaria courses in the Far East, has kept this in mind and in consequence the arrangements for the Eastern course will provide that the field instruction be carried out in a country other than that from which the students have come while, in addition, three experts from overseas countries will be included among the lecturers.

After much discussion of the question with administrative and other health authorities in the East, the League concluded that Singapore was the logical place to hold such courses. This decision was influenced to some extent by the fact that Singapore was the headquarters of the Eastern Bureau of the Health

Organization and that it also possessed a well-equipped medical school recognized by the General Medical Council of Great Britain.

The League has now organized a yearly course of theoretical and practical training in Singapore and Malaya making use of the wealth of experience of the disease in that and in the neighbouring countries in which field study will be carried out. The technical course for 1935 is in the hands of a committee consisting of Prof. E. W. Walch, Professor of Hygiene in the University of Batavia, Dr. C. L. Park, Director of the Eastern Bureau, League of Nations, Prof. J. C. Tull, Professor of Pathology, King Edward VII College of Medicine, Acting Principal of the College, and Prof. B. A. R. Gater, Professor of Biology in the King Edward VII College of Medicine. The administrative duties will be carried out by the Eastern Bureau.

The object of the courses is to complete the training of medical men who are engaged, or propose to engage, in anti-malaria work. They will thus be of interest not only to governments and municipal authorities, but also to all medical men practising in Eastern countries, particularly those engaged in estate work.

Facilities will also be provided for experienced malariologists to pursue individual research during the period of the courses, and at other times by arrangement with the King Edward VII College of Medicine.

There will be three distinct stages to each course:—

- (1) A preliminary revision course.
- (2) Theoretical and laboratory studies with practical demonstrations.
- (3) Practical field studies.

The preliminary revision course is designed for students who have a limited practical experience of malaria; and those who may wish to revise the principles of hæmatology, protozoology and entomology, and the clinical aspects of malaria. It was introduced to avoid the inclusion of the more elementary aspects of these subjects into the main course, which were not required by the more experienced students. The preliminary course occupies four days, beginning at 8 a.m. on Wednesday, 24th April.

The theoretical and laboratory studies of the main course will commence at the King Edward VII College of Medicine at 8 a.m. on Monday, 29th April, and will be completed on Saturday, 1st June.

The practical field studies will follow immediately and for this the candidates will be divided into groups, one of which will study in Malaya, one in French Indo-China, and probably another in Java. They will last approximately 21 days, during which the students will have the opportunity of becoming familiar with the routine of a malariologist and the actual application of anti-larval and other anti-malarial measures to field conditions.

Conditions of admission

The courses are intended for medical graduates already engaged, or likely to be engaged, in anti-malarial work.

The subscription for the theoretical and laboratory course will be seventy-five Straits dollars, and will be received by the Eastern Bureau of the League of Nations at Singapore.

Candidates not attending the preliminary course will be expected to possess a working knowledge of malaria and of the fundamental principles of the contributory subjects such as hæmatology, protozoology and entomology.

Any further information desired will be supplied by the Director of the Eastern Bureau, 336, River Valley Road, Singapore, to whom applications for admission to the course should be addressed. These should reach Singapore not later than 30th March, 1935, and, as only thirty candidates can be admitted, early application is desirable.

SIR BHALCHANDRA KRISHNA MEMORIAL PRIZE MEDAL

THE following letter was received by us on 19th November. We take this opportunity of pointing out once more to secretaries of medical societies the necessity for sending notices regarding medical meetings, prize essay, etc., in good time, if they really wish the general medical profession to receive the information in time to act upon it.

In this instance the notice was not issued until two months before the last day for submission of the thesis. Even then, had it been posted punctually, it might have been included in our December number.

When, however, we did receive this notice our number was made up, and it was too late to include it. Consequently only those of our readers who received information about this prize from other sources will be able to enter for it this year. Our only reason for including this notice is that the prize is to be given annually.

Dear Sir,

At a meeting of the subscribers of Sir Bhalchandra Krishna Memorial Fund held on the 11th July, 1924, the following resolution was adopted:—

'That from the funds collected to perpetuate the memory of the late Sir Bhalchandra Krishna, Kt., a Memorial Prize Medal be founded to be awarded every year on the anniversary of his death to a member of the medical profession who submits a thesis or delivers a lecture on any medical subject before a meeting of the medical profession to be held under the auspices of the Bombay Medical Union, preference to be given to one who submits any original or research work especially with reference to indigenous medicine on Western lines'.

In consonance with the above resolution, members of the profession are invited to submit a thesis or a paper by the 15th of January, 1935, to the undersigned for submission to a selection committee for making the above award.

The thesis or paper shall have to be read by the prize-man on the day of the award at a meeting of the profession to be held in accordance with the above resolution.

(Signed) Members of the Sir Bhalchandra Krishna Memorial Prize Medal Committee.

BOMBAY MEDICAL UNION,
BLAVATSKY LODGE BUILDING,
FRENCH BRIDGE, CHOWPATY,
BOMBAY, 6th November, 1934.

Current Topics

Treatment of Migraine

By MACDONALD CRITCHLEY, M.D., F.R.C.P.

(Abstracted from the *Practitioner*, Vol. CXXXIII, July 1934, p. 54)

It must be conceded that the results of treatment in migraine are not altogether satisfactory. Certainly the majority of cases, in which the attacks are neither excessively frequent nor severe, respond to a line of treatment conscientiously followed over an adequate period. On the other hand, a small proportion of cases completely fail to react to the usual therapeutic measures, which may, indeed, appear even to aggravate the symptoms. In another type attacks are of such violence and duration, and the inter-paroxysmal period is so short, that the ordinary treatments prove useless and the victim suffers an almost constant disability. Such examples of migraine major strain the resources of therapeutics.

The modern conception of migraine is that of a constitutional type of reaction to various kinds of stress. A person is either afflicted with a migrainous diathesis from an early age, or he is completely spared. He is unlikely to acquire the malady in adulthood. The migrainous constitution needs an additional stimulus, physical or psychological, before an attack is precipitated. Most often the type of stimulus is peculiar to the individual sufferer, though occasionally an attack may be produced in one person by more than one factor. The time will no doubt come when the physician will be able confidently to recognize the etiological factors in each case of migraine, to identify the particular stress, and to apply the approximate treatment. To-day, we can only aspire to such an ideal, realizing that even when the precipitating mechanisms are recognized they may still be immovable. The most important single factor in the production of migraine is to be found in errors of refraction. Without over-emphasizing the rôle of ocular defects in the etiology of migraine it must be laid down that the first step in treatment is to secure expert ophthalmic assistance.

Unquestionably the most useful drug in the treatment of migraine is luminal. The patient should persevere with this remedy for at least three months, and if it proves beneficial there is no reason why the medicine should not be continued for two or three years. Luminal is better prescribed in tablet form rather than as the soluble sodium salt. The dosage may be varied to suit the patient. One grain at night may be adequate, or gr. $\frac{1}{2}$ twice daily. In more obstinate cases, gr. i may be taken night and morning. Sleepiness and dullness do not persist with gr. i doses except in the very uncommon cases of luminal sensitivity. Grimes has suggested a combination of luminal with alkalis. He prescribes 10 grams of sodium bicarbonate in a pint of water, two hours after meals, and a $\frac{1}{2}$ grain of luminal on retiring. According to this author, this treatment should be continued for one year, four weeks at a time with intervals of two weeks.

I am inclined to regard thyroid as the next most useful drug in the treatment of migraine. The dosage should be small, as for example gr. 1/10 t.d.s. of the thyroid sicc. (1932). Nitroglycerine, an old-fashioned remedy, may be taken in the form of the chocolate-coated tablets of gr. 1/150—1/200 twice daily. It also occurs combined with strychnine and gelsemium in Gowers' well-known mixture:—

Tincturæ nucis vomicæ	..	..	mx
Tincturæ gelsemii	..	..	mx
Liquoris trinitrini	..	..	mi
Acidi phosphorici diluti	..	..	mx
Aquam chloroformi ad	..	..	ss
		t.d.s.	

The modern and more potent luminal has tended to thrust into the background the use of nitroglycerine. These three measures (luminal, thyroid and Gowers' mixture) may be employed in all cases of migraine, whatever the etiological type. There are other therapeutic possibilities in certain well-defined types of migraine of obvious nature. In cases of 'biliary' migraine, T. C. Hunt has advocated the use of bile salts. These may be prescribed as decholin (Riedel) in the dosage of one to six tablets daily. Another method is to give sodium glycocholate, in gr. 2—20 capsules. Full doses are the most efficacious, but occasionally are precluded by nausea and diarrhoea.

Cases of 'menstrual' migraine are often relieved by the regular employment of ovarian or placental extracts. A. P. Thompson suggests an injection of theelin (50 rat-units or 1 c.cm.) three times during the week prior to the period. If the headache bears no regular time-relationship with menstruation, 50 units may be injected two or three times each week. Blakie and Hossack advocate emmenin complex in one-half drachm doses twice daily for three weeks after each menstrual period. The dosage may be increased if necessary to 3i thrice daily. Our own experience with this drug has been

varied; some cases have appeared considerably improved, while others, clinically very alike, have failed to respond.

When migraine is of allergic origin, best results are obtained by the rigid exclusion of the responsible article of diet. Treatment with intravenous injection of a 5 per cent solution of peptone twice weekly, if less efficacious, merits a trial. The initial dose is 0.25 c.cm., and this is increased by 0.25 c.cm. until a maximum of 1.25 c.cm. is reached. Peptone, given by the mouth, is apparently disappointing. Some cases of migraine seem to be associated with attacks of rheumatic fibrositis, especially in the muscles of the neck and shoulders. Here relief can be obtained by the regular use of small doses of aspirin, by deep massage and radiant heat to the cervical region, and the eradication of focal sepsis. Recently, success has been claimed with chondroitin-sulphuric acid, given in capsules or as a powder. The dose is 1 gram thrice daily, or 3 grams at night.

From time to time cases of migraine resistant to all forms of medical treatment occur. To relieve such victims of their perpetual misery, help may be sought from the surgeon. Removal of the cervical and upper thoracic ganglia has been carried out in a few cases with apparent relief to the migraine. In strictly unilateral cases, in which the headache is always on the same side, Dickerson's operation of ligating the middle meningeal artery on the affected side may be borne in mind. It is difficult to be sure whether the ligation or the mere trephining is the more important factor in this form of treatment.

Treatment of a threatening attack.—Migrainous patients are frequently aroused early in the mornings by a commencing attack. Other persons, however, suffer their paroxysms in the day-time and are given abundant warning of an oncoming attack. It is possible that prompt treatment may be successful in cutting short what would otherwise be a prolonged and severe bout of migraine. A full dose of glucose or of cane sugar may be efficacious—particularly in those cases apparently brought on by hunger. An effervescent saline aperient draught is sometimes successful. Probably the best policy is for the patient promptly to give up work and to lie down, with the object of securing sleep. Reading and smoking should be forbidden, but two or three tablets of aspirin, or preferably an aspirin-phenacetin-caffeine compound, may be given with a cup of tea, coffee or maté. Another useful device is for the patient to take an extra tablet of luminal as soon as he notices the symptoms of an impending attack.

Treatment of the attack.—The victim will not need to be told to go to bed and to keep completely quiet. In the less severe paroxysms treatment will undoubtedly relieve and probably curtail the symptoms. With the more intense attacks, particularly those ordinarily lasting many hours and associated with severe vomiting, treatment is probably without avail. Morphine should, of course, be withheld. The stronger synthetic analgesics are well worth a trial, particularly when combined with a barbiturate. The following may be prescribed: one to two tablets of either veyanin (Goedecke) (codeine-aspirin-phenacetin); combral (Bayer) (pyramidon-trichlorethylurethane); veramon (Schering) (pyramidon-veronal); or dialacetin (phenacetin-diallyl-barbituric acid). Bromides are often employed, but with disappointing results. In the great majority of cases, the paroxysm does not cease with vomiting; indeed, vomiting may be obstinately present for two or three days. When nursing facilities permit, glucose enemas may be tried. T. C. Hunt has recently drawn attention to the value of adrenaline. Ten minims of a 1/1000 solution may be injected, and in severer cases 15 or 20 minims administered very slowly. Dejean has had success with injections of acetylcholine, 0.1 gram, during an attack. In the so-called 'sympatheticotonic' cases, with evidences of vasoconstriction, ergotamine tartarate (gynergen) may

be tried. This is administered either hypodermically in doses of 0.5 c.cm (7½ minims) or by mouth in tablet form.

The Present Position of the Treatment of Varicose Veins

By DAVID H. PATEY, M.S., F.R.C.S.

(From the *Practitioner*, Vol. CXXXII, June 1934, p. 695)

THE introduction a few years ago of injection treatment completely altered, almost in a night, the whole treatment of varicose veins. Operations for varicose veins disappeared from the operating lists, and the knife was banished to make room for the needle. There is now available, it was argued, a simple, safe, and sure method of treatment for all cases of varicose veins, and one moreover that can be carried out without the expense and inconvenience of confinement to bed. So great became the demand for the new treatment that many hospitals had to set up special clinics to cope with the crowds of patients, and in addition practitioners everywhere were called upon to treat large numbers of patients. Recently, however, signs have begun to appear that everything is not well with the injection treatment of varicose veins. Articles have appeared in the medical press of many countries complaining of the high incidence of recurrence after injection treatment; other papers have dwelt on the importance of prolonged after-care, and operative procedures of various types have begun to creep back. The time therefore is ripe to recast our ideas on the treatment of varicose veins. This article, based on the work of the varicose vein clinic of the Middlesex Hospital during the past four years, reviews my conclusions on the position which operation, injections, and other measures should occupy in the treatment of varicose veins to-day.

In the first place, all cases of varicose veins are not alike, and what may be suitable treatment for one case may not necessarily be so for another. The following is a simple clinical grouping of varicose vein cases together with the treatment advised for each group:—

(1) *Varicose veins filling by single, readily recognizable, and easily controlled venous trunks.*—The classical example of this is the varicose condition of the internal saphenous venous system in which there is a dilated incompetent main internal saphenous vein in the thigh, and varicosities of different sizes and degrees of complexity in the leg, all of which after emptying are controlled by pressure on the main saphenous trunk in the thigh. Before the days of injection treatment, this type of case was treated by Trendelenburg's operation, which consisted in excision of the extreme upper part of the saphenous trunk. Although this operation often gave very good results, it sometimes failed owing to the presence and subsequent development of perforating communicating veins lower down. On the other hand, injection treatment alone is not usually satisfactory owing to the difficulty of obliterating the main saphenous trunk, and the frequency of its recanalization. In these cases the most successful results can be obtained by a combination of excision and injections. Probably it is best to excise the whole of the main vein in the thigh from the saphenous opening to the inner side of the knee, and this can readily be done subcutaneously with Babcock's probes. This operation, however, requires a general anaesthetic and a stay in bed, and in order to avoid this we have contented ourselves in most cases with excising about four inches of the vein from the middle of the thigh through a vertical incision under local anaesthesia, the patient subsequently being allowed to return home. This more limited operation is performed in the operating theatre with all aseptic precautions and particular attention is paid to hæmostasis, the cut ends of the main vein being tied with two, or even three, separate ligatures. With these precautions there has

not been any anxiety about treating these cases as out-patients. At the time of the operation an injection is given into the lower end of the exposed vein. The solution used has been quinine and urethane of half the usual strength (i.e., quinine bihydrochloride approximately 5 per cent instead of the usual 10 per cent), and we have injected up to 8 c.cm., depending on the extent of the varicosities, the usual dose being 5 to 6 c.cm. At the end of the operation the leg is bandaged from the instep to above the incision with elastic adherent strapping. The patient is instructed to take things quietly for the first 48 hours, and the strapping is left undisturbed for ten days.

The results in suitably chosen cases of this combined excision and injection treatment have proved very satisfactory, and in many cases the procedure described is sufficient to obliterate the whole varicose area. If a few varicose veins still remain, they usually respond readily to one or two further injections, since the main regurgitant stream has been cut off.

We also endeavour to apply this combined treatment in other similar types of varicosity besides the classical internal saphenous, whenever it can be demonstrated that there is a varicose system fed predominantly by one venous trunk controllable by pressure.

(2) *Early varicose veins.*—A type of case frequently seen is that of a young woman or girl who has noticed a few small varicose veins and comes because of their bad cosmetic effect, rather than because they are causing any trouble. Cases of this type are the most satisfactory for pure injection treatment; the veins usually respond readily, the treatment is not prolonged, and experience proves that the late results are good. A word of caution, however, is necessary about the treatment of these cases: sometimes in anxiety about the beauty of her legs, the patient comes with veins so small that their injection would be very difficult. It is best, therefore, owing to the disastrous effects following leakage of the solutions into the subcutaneous tissues, not to be too ambitious in these cases, and to treat those veins only which can quite certainly be safely injected.

(3) *Extensive varicose veins filling through numerous venous trunks, difficult to recognize, and impossible to control by proximal pressure.*—This is a very difficult type of case to deal with. Treatment by operation alone is unsatisfactory, since it is practically impossible to secure all the communicating venous trunks through which the varicose veins fill. Injections in many cases undoubtedly give considerable symptomatic relief and cosmetic improvement, but the treatment has definite disadvantages and limitations. For in these extensive cases it is a long and tedious business for both patient and practitioner, often extending over many months, and at the end recurrence owing to recanalization of obliterated veins is not unlikely. Each case has to be judged on its merits, and it is probably best to explain fully to the patient the possibilities and the difficulties, and to weigh carefully other factors, such as the age and temperament of the patient, before deciding whether active treatment by injections or palliative treatment by supporting bandages is best suited to the particular case.

(4) *Very large varicose veins.*—Very large varicose veins are difficult to obliterate by injections; large doses are usually required, and, if successful, the resultant local reaction is likely to be severe. For this reason, very large varicose veins are probably best treated by excision or a combination of ligature and injections.

(5) *Dilated skin venules.*—In some cases the patient is chiefly concerned about collections of small dilated skin venules rather than subcutaneous varicose veins. The treatment of these skin venules is not very satisfactory, as they do not as a rule lend themselves to direct injections. If there is an obviously communicating subcutaneous varicose vein, the injection

of this sometimes does good. Otherwise, the possibility of x-ray or radium treatment as for angiomas should be considered.

(6) *Varicose veins associated with ulcers.*—The relation of varicose ulcer to varicose veins is not always clear. Thus, on the one hand, very well-marked cases of varicose veins without the slightest trace of skin bluish are common, and, on the other hand, varicose ulcers without any trace of varicose veins are frequently seen. But if varicose veins are present in association with ulcers, it is as well to give the patient the benefit of the doubt and, in addition to treating the varicose ulcer, to treat the veins actively by the means best suited to the particular case. Unfortunately, it is impossible absolutely to guarantee that the treatment of the varicose veins will prevent the recurrence of the ulcer.

(7) *Varicose veins associated with other leg troubles.*—Finally, patients with varicose veins not infrequently suffer from symptoms due to other troubles, such as foot strain. It is, of course, important to recognize this, as the proper treatment in these cases is that of the condition causing the symptoms, the veins often not requiring active treatment.

Conclusion.—Many points in the aetiology of varicose veins are still obscure, and until these are cleared up treatment cannot be entirely rational and satisfactory. At present it is necessary to recognize that cases of varicose veins fall into different clinical types demanding different types of treatment. But contrary to what is sometimes thought, surgical methods still occupy an important place in the treatment of varicose veins, and the best results are obtainable in cases in which surgical and injection methods can be combined.

Typhus Fevers in the Tropics

By SIR JOHN MEGAW, K.C.I.E.

(Abstracted from the *British Medical Journal*, 11th August, 1934, p. 244)

THE title of the present discussion is 'Tropical Typhus', but this name is obviously inappropriate, as the fevers with which we are dealing occur just as frequently in cold countries as in hot. A more suitable name is 'Typhus Fevers in the Tropics', and although some experts are sure to object, I will adopt this until something better is suggested.

TYPHUS AS AN EPIDEMIC DISEASE

'Every schoolboy knows' that the name 'typhus fever' was originally applied to typhoid and relapsing fever as well as to typhus. In 1837 Still and Gerhard showed that typhoid fever was a distinct disease, and in 1843 Henderson differentiated relapsing fever. In 1862 Murchison emphasized the contagious nature of typhus fever. Nicolle and Conseil, in 1909, proved that the disease could be conveyed by lice. Between 1906 and 1910 Ricketts and Wilder suggested that the bodies now known as Rickettsia bodies were the causal organisms of typhus fever and Rocky Mountain spotted fever. In 1910 Wilson of Belfast discovered that the sera of typhus patients agglutinated organisms of the *coli* group which had been isolated from cases of the disease. He was careful to point out that he did not regard this agglutination response as indicating that the organisms caused typhus fever. Weil and Felix in 1916 described the reaction which is now known by their name; they used an organism called 'proteus X 19'.

Until recently typhus exanthematicus was regarded as being essentially different from the other fevers which resembled it so closely in their clinical features; the reason being that these fevers were in sharp contrast with typhus in not being epidemic diseases

associated with crowding, poverty, filth, and lice, and in not being directly communicable from man to man. Accordingly, even the spotted fever of the Rocky Mountains, which closely resembles typhus, was regarded by nearly all observers as belonging to a different disease group, until Wolbach, in his masterly monographs on the subject in 1916 to 1919, showed the essential similarity in the pathology of these two fevers. Sambon, however, had previously insisted that they were really the same as typhus fever.

So long ago as 1897 Brill of New York had discussed the relation between the disease which now goes by his name and typhus fever; he concluded that the epidemiological differences were so great as to make it impossible to place the two fevers in the same group, but in 1912 Brill's disease came to be regarded as an inter-epidemic form of typhus, because its virus was found to protect animals against typhus.

At this date the position was that typhus fever was regarded as a unitary disease, while the Rocky Mountain and Japanese fevers were considered as belonging to a different category; they were known to be communicated from rodents to man by ticks and mites respectively.

INSECT VECTORS IN OTHER DISEASES RESEMBLING TYPHUS

A brief reference must be made to some fevers, the aetiology of which was not known at first, but which are now recognized as belonging to the typhus disease group. In 1910 Smithson in Queensland described a fever resembling Brill's disease; he suspected that the vector was some insect living in sugar canes. The same year Connor and Bruch described a similar disease in Tunis, and called it 'fièvre boutonneuse'. In 1911 McNaught gave an account of an anomalous form of paratyphoid occurring in South Africa. In his report he makes a significant reference to a suggestion by Colonel Maher that the fever might be connected with ticks, since he found that some of the patients had been bitten by ticks prior to the onset. McKechnie, in 1913, wrote a very interesting report, unfortunately never published, of a fever prevalent in one locality in the Kumaon region of the lower Himalayas. He called this fever typhus, and suggested fleas, bugs, and mosquitoes as possible vectors. Two years later, in 1915, Schüffner described a pseudo-typhus fever in Sumatra, and suspected a tick or mite of being the vector. The name given by Schüffner would probably be more correctly translated into English as pseudo-typhoid, as I understand he was thinking of typhus abdominalis rather than typhus exanthematicus.

NON-EPIDEMIC TYPHUS IN INDIA

My own experience of a non-epidemic typhus fever was thrust upon me rather than sought. In June 1916, while in the near neighbourhood of the place where McKechnie had already reported his cases of typhus, I found a tick on my neck in circumstances which indicated that it must have attached itself about twelve hours earlier. Some twenty days later, after returning to Lucknow, I began to suffer from fever with a step-like rise in temperature; within four days an eruption appeared, which recalled to my mind the descriptions I had read of the Rocky Mountain fever. At that time no human disease was known to be conveyed by a tick in India, so I had light-heartedly thrown away a very interesting specimen which, within a few days, assumed considerable importance as being the only likely vector of my attack of fever.

I wrote an account of my case in the *Indian Medical Gazette* of January 1917, in which I suggested that the tick must have been either *Rhipicephalus sanguineus* or *Hyalomma aegyptium*. This, I think, was the first case in which definite evidence was produced

of a tick being the vector of a typhus-like fever outside the Rocky Mountain fever zone. I also suggested that McKeechnie's Kumaon fever and the fevers described by Conor, McNaught, and others should be classed with the spotted fever of Idaho and Brill's disease as a sub-group of typhus fever, differing from that fever in being conveyed by ticks or fleas, in being place diseases, and in having no connection with lice, famine, dirt, or overcrowding. I fell into one serious error in regarding the low virulence of these diseases as being an important feature in differentiating them from classical typhus, but apart from this I have nothing to retract from what I wrote nearly eighteen years ago.

Several readers of my note, including Major-General Sprawson and Colonel Chapman, sent me accounts of similar cases which they had observed in various places in India. On the strength of these reports and after further study of the subject, I felt justified in suggesting in a paper published in the *Indian Medical Gazette* of October 1921 that a fever conveyed to man from an animal of the wilds by a tick was widely distributed in India and probably in other parts of the world; that this could not be clearly distinguished from the Rocky Mountain fever; and that it, with the other sporadic typhus-like diseases, should be classified as members of the typhus fever group. Accordingly, I suggested the classification 'louse typhus', 'tick typhus', and 'mite typhus'. In later papers I produced evidence of the frequent occurrence of tick typhus in various parts of India as well as in other countries, and added to my previously proposed classification another heading—namely, 'typhus of unknown vector'.

FLETCHER'S WORK IN THE FEDERATED MALAY STATES

Apart from work in the Rocky Mountain, Japanese, and Indian areas, there was little evidence of interest in the sporadic typhus fevers until 1926, when Dr. William Fletcher described a number of cases of 'tropical typhus' in the Federated Malay States. Dr. Fletcher was struck with the resemblance between his cases and those described by me in India, but he found no evidence of tick bite, and the agglutination response to *proteus* X organisms was quite different in his cases from that observed in India. In the Indian tick typhus the Weil-Felix reaction was usually negative, or positive only in such dilutions as 1 in 80 or 1 in 100 to *proteus* X 19, whereas Fletcher found two sharply contrasted groups of cases, one of which gave a strongly positive reaction to *proteus* X 19 and was negative to the Kingsbury strain of *proteus*, while the other reacted to the Kingsbury strain of *proteus* X but was negative to *proteus* X 19. At first the differences between the two forms of tropical typhus and tick typhus were rather puzzling, but recent work indicates that there really are three distinct types of sporadic typhus—namely, tick typhus, mite typhus, and flea typhus—and that each of these shows a distinct characteristic agglutination response towards *proteus* X organisms.

Apart altogether from its great intrinsic value, Dr. Fletcher's report was very important in attracting the attention of the medical world to these sporadic typhus fevers. Within the past few years a vast number of observations have been published showing that the fevers of the typhus group are very widespread in their distribution and of considerable practical importance.

It was not until 1930 that Durand, Conseil, and Brumpt demonstrated the conveyance of 'fièvre boutonneuse' by a tick, *Rhipicephalus sanguineus*, which was one of the two suspected by me in 1916. Now we know also that the form of sporadic typhus which conforms to Brill's description is conveyed from rats to man by fleas, so that to my previous provisional classification there must now be added another sub-group—'flea typhus'.

NEED FOR UNIFORM NOMENCLATURE

A few words must be said on the subject of the classification of the typhus fevers. Dr. E. W. Goodall objected to Dr. Fletcher's use of the name 'tropical typhus', on the ground that all the typhus fevers ought to be called typhus pure and simple, irrespective of the vectors concerned and any other differences that exist between them. While I object to the name 'tropical typhus', I object much more strongly to the position adopted by Dr. Goodall, for although the sporadic fevers are very similar to louse typhus in their clinical and pathological features, they are poles asunder in their epidemiology and in the measures that are called for in their practical management. If the name 'typhus' were applied to all fevers of the group without further qualification a very misleading suggestion would be conveyed.

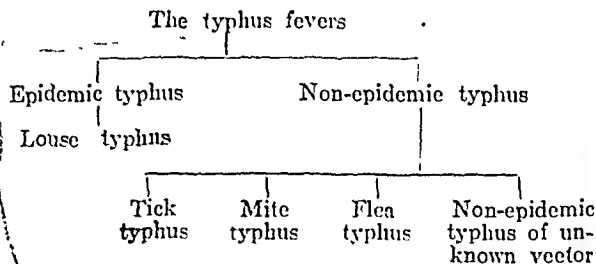
Disease nomenclature is intended to be helpful to the medical man, and should be as simple as possible, but if we attempt to secure simplicity by lumping together things that are essentially different the only result will be confusion. The classification of the typhus fevers is a matter of real importance, and I take this opportunity of appealing once more for the adoption of a uniform and rational nomenclature. The need for this step is evident when we consider that more than a dozen different names were given to the sporadic typhus fevers in a single recent issue of the *Tropical Diseases Bulletin*. Here is an incomplete list of twenty-seven names which have been used during the past few years for these fevers: spotted fever of the Rocky Mountains, fièvre boutonnière, fièvre exanthématique, fièvre escharo nodularis, eruptive fever, macular fever, Marseilles fever, jungle typhus, spotted fever of the Eastern type, tick-bite fever, tick fever, Brill's disease, tropical typhus, endemic typhus, sporadic typhus, shop typhus, ship typhus, murine typhus, tabardillo, Mexican typhus, flea typhus, Manchurian typhus, Japanese river fever, tsutsugamushi, pseudo-typhoid of Deli, Mossmann fever, and mite typhus. This is an appalling list, the only redeeming feature of which is the growing tendency to use the name typhus. Place names are obviously unsuitable; they suggest that the disease is restricted to one locality—for example, I could not have described Indian tick typhus as Rocky Mountain fever. Names like 'spotted' or 'macular' are also unsatisfactory; there are so many fevers in which spots or macules appear that the name becomes meaningless.

My provisional suggestion that the word typhus qualified by the name of the vector should be employed was open to criticism, because the vector was often unknown or doubtful. This perfectly sound objection can only be met by a frank confession of ignorance when the actual vector is unknown or doubtful, and accordingly employing the non-committal general term 'non-epidemic typhus' to indicate those fevers which are not conveyed from man to man by lice as contrasted with 'epidemic typhus', which has a human reservoir of infection. The term 'endemic' would be neater and better than 'non-epidemic', but it has already been earmarked as a name for flea typhus, and therefore could not be used without risk of confusion.

SUGGESTED CLASSIFICATION

Evidence is now accumulating to show that the specific agglutination response of each of the non-epidemic typhus fevers is associated with the vector concerned, so that we may soon be able to classify the fevers according to the vector, even when there is no direct evidence as to which arthropod is responsible in any given case. With the rapid accumulation of more knowledge of the geographical distribution of the fevers, difficulty in assigning each case to the appropriate vector should soon disappear. Until

something better is proposed I therefore suggest the following modification of my original classification.



This classification is not ideal, since, apart from the occasional difficulty of determining which vector is concerned, we are not yet able definitely to state that there are four distinct types of virus. In louse, tick, and mite typhus the evidence is already fairly strong that each virus is different from the others; at any rate there is no case on record of direct communication of tick or mite typhus from one person to another, and, after all, the manner of conveyance of the diseases is by far the most important practical matter from the physician's point of view. Flea typhus is so closely related to louse typhus in its immunological and serological aspects that careful research will be needed to determine whether or not the virus of louse typhus can ever be transmitted by fleas. If this virus be transmissible by fleas it must be greatly attenuated in the process, since flea typhus is the one type which has never been found to be severe. There is no evidence that any of the non-epidemic typhus fevers has ever started in a louse-borne epidemic, so that although there may be some mental reservations regarding the relation of the fevers, practising physicians can safely base their action on the hypothesis that epidemic and non-epidemic typhus fevers are essentially distinct from each other.

DIFFERENTIAL DIAGNOSIS

I have already referred to the error into which I fell eighteen years ago with regard to virulence; the truth is that tick typhus and mite typhus may be very mild or very severe. The same applies to a lesser extent to louse typhus, which is sometimes quite mild. Flea typhus alone has a consistent record of mildness so far, although severe or even fatal cases have been recorded. Another point which is sometimes relied on for differential diagnosis between the various forms of non-epidemic typhus is the presence or absence of local necrosis at the site of infection associated with lymphangitis. This feature is sometimes present and sometimes absent, both in tick typhus and mite typhus; it cannot, therefore, be relied on as a point of distinction between the two fevers. Agglutination and animal inoculation tests are not always conclusive, so that when there is no positive evidence regarding the vector, difficulty may arise at times in individual cases in distinguishing between the three types of non-epidemic typhus.

On the other hand, there will seldom be any difficulty in deciding whether any given fever belongs to the epidemic or non-epidemic group if all the circumstances of each case or outbreak are investigated. After all, the chief concern of the medical man is to decide whether he is dealing with a disease which calls for extremely careful precautions to prevent spread to other human beings or with a disease not communicable from man to man.

Serological tests against two or more varieties of *proteus* X organisms will often be of great help in diagnosis, and knowledge of the local conditions will usually make it possible to be reasonably certain of the particular vector which is concerned.

We are now at an interesting stage of the investigation, and with so many intelligent observers at

work throughout the world we seem to be rapidly approaching the time when the non-epidemic typhus fevers will be completely rescued from the small and rapidly diminishing group of fevers of unknown or doubtful aetiology. The most astonishing feature of the non-epidemic typhus fevers is that they escaped recognition so long in many parts of the world, in spite of their striking and characteristic features.

The Pain of Herpes Zoster Treated with Pituitrin

By FRANCIS H. GILLET, M.B. (Camb.)

(Abstracted from the *Lancet*, 11th August, 1934, p. 307)

DRAMATIC results with the injection of pituitrin for the treatment of herpes zoster have been reported in the American and continental medical press during the last few years, and considering the remarkable relief which sometimes is given to the patient by these injections, it is surprising that the treatment receives so little attention.

Sidlick in 1930 described four cases from a series of 54 patients suffering from herpes zoster treated with pituitrin. These four suffered agonizing pain and the treatment was most efficient. Niles in 1932 also described a series of 16 cases treated with pituitrin, and considers that the most brilliant results were obtained in the very early cases and that the course of the disease was shortened by about two and a half days. He found that the severe pain was usually rapidly relieved. The writer treated a number of cases of which he reports three in detail, giving 1 c.cm. of pituitrin intramuscularly; it usually caused complete disappearance of the pain almost immediately. He draws the following conclusions from comparison of his experience to that of others:—

I have found that the injection of pituitrin is an uncertain and by no means an infallible treatment. It appears to act most dramatically when the pain is most intense. I can at present offer no explanation of why this should be so, but the treatment is a valuable asset to the practitioner in his attempt to relieve a patient from the pain accompanying herpes zoster.

The Value of Tuberculin Tests

By HALLIDAY SUTHERLAND, M.D.

(From the *Medical Press and Circular*, 15th August, 1934, Vol. CLXXXIX, p. 155)

'In its beginning the malady is easy to cure, but difficult to detect; but in course of time, when neither detected nor treated, it becomes easy to detect but difficult to cure'. So Machiavelli wrote about pulmonary tuberculosis over 400 years ago; but now, by means of the tuberculin tests, the earliest suspicion of tuberculosis may be confirmed or negated with certitude. There is a heavy responsibility on anyone who neglects to use this means of diagnosis.

For the patient the difference between early and delayed diagnosis may mean life or death. If diagnosis be delayed until tubercle bacilli appear in the sputum, the patient has probably infected the members of his family. To delay diagnosis until the patient is seriously ill means that he must abandon work and undergo sanatorium treatment, which is costly.

In the early afebrile stage the patient could have been immunized ten thousandfold with tuberculin at a fraction of the cost of sanatorium treatment, and without the necessity for giving up work.

At the Westmoreland Sanatorium I once awaited the arrival of a patient certified by his doctor to be an early case. A cab came up the drive and inside the cab was the patient—dead. That is an extreme case. Yet in many sanatorium cases the disease could have been diagnosed months, or even years, earlier if the general practitioner had looked for early symptoms and

used the tuberculin tests. Patients will often hide the truth from their doctor, but some of the early symptoms are always present: a dry, explosive cough called 'the stomach cough', a little phlegm in the morning, 'colds that fly to the chest', loss of appetite and weight, dyspepsia, and pain in the chest, with or without signs of dry pleurisy.

These are the early symptoms, but no one who relies solely on physical, radiological and sputum examination is capable of making an early diagnosis with any certitude. The physical signs of early pulmonary tuberculosis are not diagnostic. They may occur in other diseases of the lung, or may be absent. A tuberculous nodule must attain a size of four cubic millimetres before its shadow is thrown on to a radiogram. Increased apical striation is suspicious, but not diagnostic. Nodules, mottling, and excavation are radiographic signs of advanced disease. The presence of tubercle bacilli in the sputum is not a sign of early tubercle, nor does their absence exclude tuberculosis. With early signs and symptoms it is impossible to make a firm diagnosis one way or the other, unless tuberculin tests are used. In cases where no tubercle bacilli are detected in the sputum, but whose symptoms, physical signs or radiograms suggest the possibility of tubercle, I begin with the cutaneous test.

THE CUTANEOUS TEST

The front of the forearm below the elbow is cleansed with ether, a drop of old tuberculin is placed on the skin, and the cuticle under the drop is tattooed with a hollow needle. In children the back of the shoulder is selected. The needle merely pricks the cuticle and there should be no bleeding. No dressing is required.

A positive action may appear within six to forty-eight hours: a raised, circular, reddened indurated area of skin, slightly tender to the touch. The extent of induration varies with the severity of the reaction, reaches its height within three or four days, and then begins to disappear. A negative reaction may show transient redness within forty-eight hours, but no induration.

Some prefer the intracutaneous test, in which the reaction is obtained by injecting 0.1 c.c. of a 1 in 1,000 solution of old tuberculin under the cuticle, but not under the skin. The reaction is more painful than the cutaneous test, and is more likely to provoke a general febrile reaction, or even a focal reaction at the site of the disease. The intracutaneous test gives a higher percentage of positive reactions than the cutaneous test; but that is of little advantage, because the main value of both tests is when they give no reaction, and thus enable us to exclude a diagnosis of tuberculosis. In the case of nervous children the percutaneous test is very useful. An ointment of 50 per cent tuberculin in lanolin is rubbed with a finger stall into the skin. A piece the size of a pea is sufficient. In one or two days a papular eruption on an erythematous base may appear.

INTERPRETATION

A negative skin test, except in patients dying of tubercle, shows that the body has been, and is, free of tuberculous infection. Most healthy adults have been infected at one time or another with tubercle bacilli, and so in the great majority of cases the test is positive and of little value in diagnosis, because the skin tests cannot distinguish between latent and active disease. At the age of twenty-six I had a negative cutaneous test before going as resident physician to the Royal Victoria Hospital for Consumption. Six months later I was a 'positive'. In the interval I had been infected, and remain infected, although the disease has never developed. A positive skin test has more significance in children, especially in children under five; but even then it is not diagnostic, because of clinically non-tuberculous children, 20 per cent react to the cutaneous test and 40 per cent to the intracutaneous test:

All the skin tests are qualitative. They reveal the existence of tuberculous infection, without giving any indication as to whether infection is latent or active. Various attempts have been made to make these tests quantitative, in order to distinguish between active and latent infection, but without success.

THE SUBCUTANEOUS TEST

When the cutaneous test is positive I proceed to the subcutaneous test with a view to discovering whether the infection is latent or active. In the subcutaneous test we look for a rise of temperature. Consequently the test can only be done in afebrile cases. If there is fever, this must first be subdued by rest in bed. The patient charts the temperature at 8 a.m., 4 p.m., and 8 p.m. There are two degrees of reaction: a weak reaction—a rise of temperature of from $\frac{1}{2}$ to 1°F. above the mean temperature; a strong reaction—a rise of over 1°F. A weak reaction is not diagnostic unless confirmed by a strong reaction to the same dose repeated, or by a strong reaction to a larger dose.

I inject the following doses of tuberculin albumen free: 0.0001 c.c., 0.0002 c.c., 0.001 c.c., 0.005 c.c. and 0.01 c.c., with an interval of at least two days between each injection. For children under fifteen with slight signs and symptoms, the first dose is 0.00001 c.c., and for children and adults with signs of active disease in the lungs the initial dose is one ten-millionth of a c.c. Here the dose is apparently infinitesimal; but in a girl of eight with tuberculous glands in the neck I have seen a rise of temperature of 4°F. after an injection of one millionth c.c. Injections are made over the lower ribs below the scapula, where the skin is least sensitive.

The tuberculin test has a double value. A tuberculous individual reacts to an amount which has no effect upon a healthy person. Koch regarded 0.025 c.c. as the amount which usually produced symptoms in healthy adults. Therefore the value of a reaction as indicative of tubercle is in inverse proportion to the amount injected. A reaction to a small amount is of greater diagnostic value than a reaction to a larger amount. Conversely, the absence of a reaction to a large amount of tuberculin is of more value in excluding tuberculosis than the absence of a reaction to a small amount. A tuberculous subject may give three types of reaction to tuberculin: (a) Local, at the site of injection; (b) general, a rise of temperature; (c) focal, and exacerbation of signs in the tuberculous lesion. In the subcutaneous test we seek to provoke a rise of temperature only. A febrile reaction to any dose of old tuberculin up to 0.001 c.c. is definite evidence of active tuberculosis, whereas no reaction to 0.01 c.c. excludes active disease, and in all probability even latent infection. This is not a mechanical method of diagnosis, because around reactions to 0.005 c.c. there is a no-man's-land, where every other factor in the case must be weighed equally in the balance. A reaction to 0.01 c.c. cannot be accepted as evidence of active tuberculosis, because many individuals clinically non-tuberculous react to this amount.

It has been said that the subcutaneous test is dangerous. So also are injections of morphia and strychnine if too large doses be given. All tests may be dangerous in the wrong hands, but the subcutaneous test is no more dangerous than the intracutaneous test. In both tuberculin is injected into the body. By the subcutaneous route it is more rapidly absorbed than by the intracutaneous method. Yet it is possible to provoke a febrile reaction by the von Pirquet test or even by the Moro test, where tuberculin is absorbed through the skin. Moreover, the subcutaneous test avoids one danger of the intracutaneous test, ulceration of the skin over the indurated area.

Of all tuberculin tests I have found the subcutaneous the most delicate and useful in clinical diagnosis.

Psychoses in Cases of Malaria following Exhibition of Atebrin

By A. NEAVE KINGSBURY, M.D. (Lond.), D.P.H.
D.T.M. & H.

(From the *Lancet*, Vol. II, 3rd November, 1934, p. 979)

THAT certain toxic symptoms occasionally follow the exhibition of atebrin in cases of malaria is now well established. Headache, epigastric pain of a colicky nature, and yellowing of the skin and sclerae, quite unrelated to jaundice, are usually encountered in a small percentage of treated cases. Another phenomenon, first reported by Dr. O. F. Conoley in a paper (unpublished) read by him in 1933, has been described as 'cerebral excitation'. This interesting complication was brought into prominence during a local discussion on the toxic effects associated with the use of atebrin, admirably opened by Green in December 1933. During that discussion five cases of 'cerebral excitation' and also one case of intense mental depression and one of delusional insanity were described.

Early this year Dr. D. M. McSwan presented a short paper (unpublished) that included brief notes of three cases of 'cerebral excitation' and two cases of mental confusion. One of the latter cases was transferred to a mental hospital; the second was discharged, but about three weeks later was also admitted for mental treatment. Since my return from furlough, early this year, some of my colleagues have kindly communicated to me particulars of further cases that had developed suggestive symptoms.

SUMMARY

1. Seven cases of psychosis following the exhibition of atebrin to cases of malaria have been collected. Five previously unpublished cases have been cited and five more cases are recorded. These occurred among several thousand cases of malaria treated with atebrin.

2. Psychoses may occur in either sex and have occurred in five nationalities. Symptoms have developed in benign and subtertian cases and in cases with mixed infections. The complication has been noted after a minimum of 6 tablets (1 tablet t.d.s., i.e., 0.3 g. daily), a maximum of 21 tablets and an average of 13 tablets. The minimum interval between the commencement of treatment and the onset of symptoms was 1½ days, the maximum 12 days (5 days after the completion of the course) and the average 5½ days.

3. The duration of symptoms in eight mild cases varied from ½ to 7 days, with an average of 1½ days. Four more severe cases were referred to mental hospitals.

4. One mild and one severe case had histories of previous mental breakdown. Another severe case had a bad family history.

5. Two factors may be involved in the causation. The action of atebrin *vis-à-vis* the malarial parasite may result in an intense liberation of 'toxins': on the other hand, atebrin (in lethal dosage) is known to have a toxic action on the central nervous system.

6. Although the plasmodicidal effect of atebrin in a daily dosage of 0.2 g. is less favourable than that obtained with a larger intake, it is suggested that the risk of the development of psychoses would be minimized by caution in the selection of the daily dose.

The Treatment of Chronic Gravitational Ulcers of the Legs

By A. DICKSON WRIGHT, M.S., F.R.C.S.

(From the *Medical Press and Circular*,
Vol. CLXXXIX, 5th September, 1934, p. 205)

ULCERS of the leg are an ever-present problem in medical practice. Inability to handle these cases on our part has driven probably half the sufferers to

quacks and patent medicines. These patients should properly be ours, and would be if all cases were treated systematically on a definite régime as outlined in this article. Practically all the ulcers of the lower part of the leg are the result of gravity and can be called gravitational ulcers, and they are a manifestation of decompensation of the venous circulation of the legs. There are a few exceptions to this rule; Syphilitic ulcers, secondarily implanted soft sores, ulcers serpigiosus and mycotic sores provide most of these, and in the tropics the spirochaetal ulcus tropicus is very common in certain localities. 'Splenic' ulcers occur in certain splenic diseases, 'gluttony' ulcers in the obese, and Bazin's ulcers in tuberculous young women and legs affected with infantile paralysis. These exceptional ulcers, though of numerous types, only form perhaps one per cent of cases; the other ninety-nine are due to venous imbalance from the following causes:—

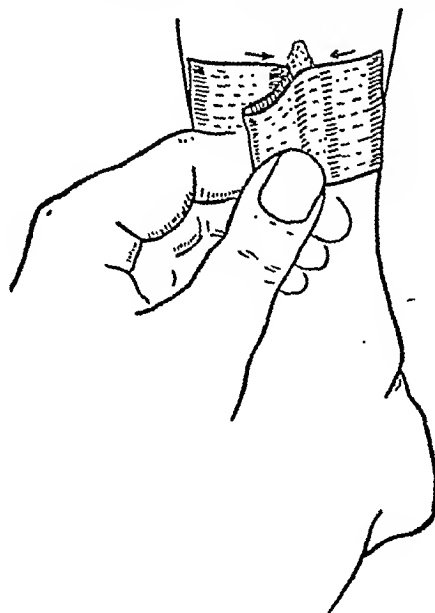
1. Varicosity of superficial or deep veins, or both.
2. Obliteration of superficial or deep veins, or both, by thrombosis.
3. Incompetence of involved veins resulting from canalization of thrombosed veins.

The result is the same, whatever the cause, and results in holding up of œdema and katabolites in the leg with resulting reduction in resistance to trauma and infection.

Whatever the cause the treatment is the same, *viz.*, to balance the arterial and venous circulations, and the indication of the accomplishment of this is the abolition of œdema, and once this is obtained the ulcers, eczema and periphlebitic induration will disappear in the most remarkable manner. To simplify treatment, six grades of ulcer will be considered.

1. *The indolent abrasion* or burn over the lower part of the leg which refuses to heal, although there is no marked varicosity or œdema of the leg. Place a strip of elastoplast loosely over the abrasion and pinch together so as to narrow the ulcer, and then secure with another strip of elastoplast and change every four to seven days, and the ulcer will quickly heal (see illustration).

2. *The small ulcer*, which is located at the lower end of a long system of varicose veins, generally



Method of pulling margins of ulcer together by pinching up a fold of sticking plaster.

starting at the saphenous opening. The ulcer is clearly the result of this one group of veins, and is not a sign of a generally disordered circulation of the leg.

Inject the veins from above down, starting with 5 c.c. sodium morrhuate 5 per cent. If no effect is obtained, change to 5 c.c. lithocaine solution (30 per cent lithium salicylate and 1 per cent tutocain), and if this again fails, try simultaneous injection of equal amounts of quinine 12 per cent and urethane and lithium salicylate into the same vein. Finally, if this fails, the vein should be ligated about 6 inches below the saphenous opening and injected with lithocaine solution 2½ c.c. above and below the ligature. This latter procedure will initiate a prompt thrombosis, and the remaining veins thrombose readily by subsequent injections at four-day intervals. During the treatment the ulcer below is strapped locally as described previously. Finally, when the veins are all thrombosed the whole leg from the toes to the knee is firmly strapped with elastoplast for fourteen days, and by this procedure the ulcer, if not already healed, will quickly close and the pressure of the elastoplast will cause the venous inflammations resulting from the injections to clear up promptly, leaving the veins as firm cords unlikely to recanalize.

3. *The moderate-sized ulcer* of up to four square inches, occurring on a very oedematous leg which has, in all probability, a valvular deficiency of the deep veins as well. Such an ulcer often occurs as a result of a white leg occurring generally more than twelve years previously. It seems to take this period of time for the leg to reach the ulceration stage. One-inch strips of Zopla plaster are applied tightly across the ulcer so as to pull the edges together and then the leg should be tightly bandaged with elastoplast, laying longitudinal strips on the narrow part of the leg and finally strapping the leg over these from toes to knee. The strapping is renewed in three days' time, because it becomes loose from the reduction of oedema. A better plan, of course, is to put the patient to bed for three days with the bed sloped, and then to start strapping while still in bed with the leg shrunk. This is, of course, not practicable in hospital practice. The strapping is again renewed after four days, and further changes at seven- or fourteen-day intervals. The veins in the thigh are injected each time the bandage is changed. It is not of much value to inject the leg veins at this time, because, as a rule, the injections do not take if the elastoplast is applied over the injected veins. When the ulcer is healed then the veins in the leg are injected and *ichthopaste bandages* used to support the leg, and it is interesting that the injections seem to take under this type of bandage. The technique of applying these bandages is important. The bandages (two) are warmed in a water bath and applied smoothly from toes to knee. The direction of the bandage should be frequently changed by cutting the bandage and changing hands, the secret being to apply short lengths instead of laying the bandage continuously, as one would do with a roller bandage. The support should be finished off with a firm crepe bandage, which sticks to the underlying moist bandage and gives an excellent combination of rigid support from the gauze ichthopaste bandage and elastic support from the crepe. Such a bandage will last anything up to six months, according to the type of patient, and then should be changed for another or a good elastic stocking. The necessity of a permanent support will depend upon two things: the amount of work and standing the patient has to do and the degree of venous incompetency left after thorough injection of the superficial veins, and this will depend upon the existence of previous deep phlebitis and valvular incompetence of the deep veins.

4. *The very indurated ulcer* on a leg solid with unpittable callous oedema resulting from long-standing circulatory imbalance. These cases should receive the tightest possible bandaging, and the most amazing reductions in size can be effected, and by displacement measurement I have in one case expelled no less than eight pints of oedema from such a leg. In addition to the strapping described in type III, a piece

of sorbo sponge should be incorporated in the bandage over the site of the ulcer. The sorbo should not be in contact with the ulcer, but separated from it by the short strips of Zopla and the longitudinal strips of elastoplast.

5. *The malleolar ulcer* occurs more commonly not on the malleolus but in the sulcus which surrounds it. This type of ulcer is especially common in cases of old femoral thrombosis, and it frequently develops even when elastic stockings are worn, because the stocking supports every part of the leg but the perimalleolar depressions. To overcome this I have had special pads made (Down Bros.) to support this part of the leg. These ulcers cause much suffering and are often known as irritable ulcers, the pain frequently being most marked in the area below the ulcer rather than in the ulcer itself; the title describes not only the ulcer but the patient's frame of mind, and these cases need much humoring and coaxing. To lessen the pain, pure amorphous aspirin (not crushed tablets) or percaïn powder may be dusted on, then the ulcer edges are pulled together with thin strips of adhesive. Over the adhesive is placed a two-inch square of 'elephant' plaster (adhesive felt), and over this a one-inch square of sorbo or onazote ½ inch thick. Finally, the whole leg is bandaged from toes to knee with a firmness proportional to the oedema. Injections are carried out as before with the greatest thoroughness, and finally an ichthopaste bandage is applied, and then, to consolidate the cure, an elastic stocking with the malleolar pads. During the early stages of the treatment recourse must be made to barbiturates and aspirin or codein to get peaceful nights, or the patient will disappear.

6. *The ulcer occurring in association with extensive eczema.* In these cases one feels nervous about applying elastoplast over such tender skin. It should always be tried nevertheless, but removed in two days to see if it suits. Fifty per cent of eczematous cases are cured with elastoplast; the other fifty per cent will be cured by the alternatives of 'ceraban' or 'ichthopaste' bandages. Very thorough injection is very necessary in eczematous cases, and the application of ung. bism. et quinoline (Stewart) or crude coal tar, 1 drachm, zinc oxide, 1 drachm, lanolin and vaseline ad. 1 ounce, under alternate bandages, is of value.

7. *Extensive ulcers* of 10 square inches up to the maximum size of 140 square inches. These ulcers always occur on very oedematous legs and require very firm bandaging or rest in bed at first to reduce the swelling. The profuse discharge leads to sliding of the bandage, so it is necessary in the more extensive ulcers to prevent the possibility of the bandage cutting by elephant plaster rather than the usual longitudinal elastoplast strips. Skin grafting is of great help in these cases, securing a more rapid healing before the skin gets 'sick' of elastoplast. The grafting is done by implanting seeds of skin under the granulations, or sewing skin strips into the granulations. The grafting does not interfere with ambulatory treatment, and after their use the same bandaging method is used. Again, consolidation of healing is secured with ichthopaste and permanence of cure with thorough injection and elastic stockings, worn for ever if thought necessary in bad cases.

Contraindication to these lines of treatment is only found in cases where arteritis is also present and the angle pulses cannot be felt. The principles of treatment should not be abandoned if eczema or blistering occur under the elastoplast. This dermatitis is of three types:

1. A simple patchy eczema of a mild type, and this can be ignored as a rule and will disappear, especially with tighter application.

2. A localized area of acute dermatitis round the ulcer, as if the combination of the discharge and the bandage composition excited an acute cutaneous inflammation. This can be dealt with by bandaging the leg with gauze before applying the elastoplast or

by laying longitudinal strips of lead adhesive (ceraban) over the raw area. In many cases this dermatitis does not occur under Zopla strips.

3. Definite allergic response shows itself by intense inflammation wherever the adhesive touches and also a generalized urticaria affecting face, neck, forearms, and so on. This may make its appearance with the first bandage in a sensitive individual, but in others it may not appear until after sensitization has occurred as a result of applying many bandages. The solution lies in changing over to 'ceraban' bandage, and if this produces the same effect ichthiopaste can be used. It is most important to adhere to the main principles of treatment—namely, compression. It is this and not the composition of the bandage which cures the ulcers.

REASONS FOR FAILURE OF TREATMENT.

1. The ulcer belongs to one of the exceptional types described in the earlier part of the article, and can be cured with N.A.B., diathermy, fungicides, etc.

2. The bandages are not applied tight enough, and here it is the patient who is often at fault rather than the doctor. She keeps up a steady appeal for

less pressure and the doctor yields. A little time spent in explanation will help this and convince her that there is no risk of cutting the circulation off completely.

3. Intermittency of treatment is the most ridiculous mistake. I have known the elastoplast bandages applied one week and ointment the next and the elastoplast again, and so on, and as a result the oedema is never controlled.

4. The bandage is not applied from toes to knee.

5. The various adjuvants to treatment are omitted, such as the pressure pads to coax indurated and malleolar ulcers to heal and the felt plaster and longitudinal strips to prevent cutting in larger ulcers.

6. Precautions to prevent recurrence are omitted after healing is obtained. This is largely due to the extravagant claims made for the injection treatment of varicose veins. These will only cure cases entirely when the deep veins are securely valved and sound. In other cases the question of prolonged or permanent support has to be considered, and also change of occupation.

7. Abandonment of treatment because of allergic eczema. The various substitutes mentioned will succeed when elastoplast fails.

Reviews

A TEXTBOOK OF GYNÆCOLOGY. Second Edition. By Arthur Hall Curtis, M.D. 1934. W. B. Saunders Company, Philadelphia and London. Pp. 493, with 300 illustrations. Price, 25s.

THE second edition of this well-known textbook has been published. There are many good illustrations, with explanatory notes; those depicting standard operations are particularly useful.

The method of arrangement of chapters appears new to one used to British and Continental textbooks. Tumours of the uterus have been discussed before 'Disturbances of Function'. It is a textbook and is presumably meant for students. It may be difficult for them to follow the sequence of description in this way.

Every chapter has been written in a very interesting manner and in simple style and much new matter has been incorporated. A great deal of the method and practice of gynæcology has been revolutionized by the great advances made in the realms of endocrine therapy. But in spite of all this advance, we agree with the author, when he says 'data obtainable from well-directed clinical experiment therapy might add greatly to our scanty knowledge of treatment. But blind administration of hormones brings harmful results'.

Chapter 42—The Early Months of Pregnancy (from a gynæcological aspect)—will be well appreciated by those for whom the book is meant. Tests for pregnancy are described and dangers of tubal insufflation and lipiodol tests are well brought to the notice of an unwary gynæcologist who is investigating the diagnosis of a pelvic tumour.

There is little new in the chapter on prolapse. There is, however, an excellent unbiased summary of the current ideas of operative and non-operative treatment of this condition. We unhesitatingly agree with the author when he says—'the Watkins-Wertheim operation is finding a more and more restricted field of usefulness in these cases'.

An elaborate summary of gynæcological pathology has been interposed in suitable places. Chapter 29—Physiology and Pathology of the Endometrium—is of particular interest because of the clear details and precise information that it contains. The mode of origin of endometrioma is discussed and Sampson's

theory—which, incidentally, is accepted by the author—is well illustrated in a nice diagram.

The author lays great stress on acquired or congenital obstruction of the cervical canal. Study of cervical erosions reveals to the author 'that a large percentage are actually devoid of an epithelial covering—the surface is composed of granulation tissue infiltrated with leucocytes'. From these opinions we differ.

The chapter on surgical technique has been well written. We read 'Recent experiments indicate that intravenous administration of glucose solution inhibits peristalsis of both the normal and the obstructed intestine'. Our experience fails to corroborate this statement.

Altogether this is a valuable book; the illustrations and the get-up are typically American; they are excellent. Modern views are set forth in a concise and interesting manner. The author has succeeded in bringing this work up to date and adding to the number of outstanding textbooks in the English language.

M. S.

A SYNOPSIS OF MEDICINE. Sixth Edition. By H. Letheby Tidy, M.A., M.D., B.Ch. (Oxon.), F.R.C.P. (Lond.). 1934. John Wright & Sons Ltd., Bristol. Pp. xvi plus 1112. Price, 21s.

THIS book has a very comprehensive scope. Of the thirteen sections the first is by far the largest, occupying 300 out of 1052 pages. The information regarding the various diseases dealt with in this section is a systematic compilation, some of it unfortunately gathered from textbooks which are not quite up to date. For instance *Atebrin* is not mentioned under malaria; under prophylaxis in leprosy it is stated 'segregation and isolation are unnecessary when sanitary conditions exist in the home'; while under yellow fever no mention is made of fixed-virus inoculation.

The sections on the various systems of the body should be of great value especially to the medical student, as a tremendous amount of compact information is compressed into a minimum of space. For the medical practitioner the chief value must be in recalling to memory subjects which have already been carefully studied from larger special works, for the amount of information given is by itself scarcely sufficient for either diagnosis or treatment.

As is stated in the introduction, this 'synopsis' cannot replace a textbook to the student, and any attempt to make it do so will inevitably lead to failure.

Yet for quick reference on almost all diseases, or as an introduction to the study of medicine especially for those with examinations in prospect, it is difficult to imagine a more useful production.

E. M.

THE BRITISH PHARMACEUTICAL CODEX, 1934.—

Published by direction of the Council of the Pharmaceutical Society of Great Britain. The Pharmaceutical Press, London. Pp. xxiii plus 1768. Price, 35s. Postage 1s. Foreign postage extra

THE aims of this publication are to provide authoritative information on all drugs in use whether these have been included in the British Pharmacopœia or not. It is published under the authority of the Council of the Pharmaceutical Society of Great Britain who appoint a large committee of experts to carry out the work, therefore the whole of its contents are thoroughly reliable. The Codex first appeared in 1907 and again in 1911, and a third time in 1923, the present edition making the third revision in twenty-eight years. It is accordingly very welcome, for the last eleven years have seen the addition of very many preparations to the list of medicaments and also a new edition of the British Pharmacopœia has recently appeared. Everything of value in therapeutics is embodied in the present edition so that it contains practically all that is in the British Pharmacopœia and a great deal in addition.

It is divided into four parts, the first being devoted to a description of drugs and their preparations, including all new organic preparations such as liver extracts, prophylactic and curative vaccines and sera, and also the vitamins, to mention only a few. This part occupies over 1100 pages. Part two describes surgical dressings and part three covers over 350 pages entirely devoted to formulæ and details of how to prepare the various drugs and their combinations. Part four is occupied with tables, giving weights and measures, atomic weights, chemical reagents and analytical tables. This enormous collection of valuable information is completed by a full index which gives after each name every page in the book on which the drug happens to be mentioned.

This book may be summed up as a necessity to all persons engaged in dispensing medicines, and of very great value to all those prescribing them.

P. A. M.

NUTRITION AND DISEASE: THE INTERACTION OF CLINICAL AND EXPERIMENTAL WORK.—By E.

Mellanby, M.D., F.R.C.P., F.R.S. 1934. Oliver and Boyd, Edinburgh. Pp. xix plus 171. Illustrated. Price, 8s. 6d.

TO-DAY many laymen are aware of the significance and relationship of food to such diseases as rickets and scurvy. In these pages however the medical man will realize that the field of nutritional disease is increasing. The book contains six chapters dealing with rickets, dental structure and disease, the thyroid gland, nutrition and infection, and finally nutritional influences on the nervous system, two chapters one on experimental work and the other on clinical conditions. The matter in the latter part of the book will probably be quite new to many. The author's views on such diseases as beri-beri and lathyrism are obviously of profound importance in this country. The possibility of subacute combined degeneration of the cord and disseminated sclerosis having a nutritional factor opens up new fields of study. The general trend of the final chapters is the significance of vitamin A in relation to the central nervous system. The author wisely cautions one against thinking that this is the only factor in such diseases. The book is

easily read, extremely interesting, and should prove of value to practitioners especially in this country.

H. E. C. W.

RECENT ADVANCES IN ALLERGY (ASTHMA, HAY FEVER, ECZEMA, MIGRAINE, ETC.).—By G. W. Bray, M.B., Ch.M. (Sydney), M.R.C.P. (Lond.). Second Edition. 1934. J. and A. Churchill, Limited, London. Pp. xv plus 503, with 106 illustrations including four coloured plates. Price, 15s.

THE author has summarized and reviewed the whole subject of allergy in this little book. Each chapter is followed by a comprehensive list of references. As an up-to-date summary, the book will be very useful for those who cannot keep abreast with the fast-increasing literature on the subject, while the copious references will be helpful to the workers on allergy.

The first 190 pages of the book are devoted to a discussion of the general aspects of allergy. The remaining portion deals with the individual manifestations, such as asthma, hay fever, allergic coryza and allergic diseases of the skin. Cerebral and gastrointestinal manifestations of allergy, physical and drug allergy, allergic joint conditions, etc., have all been well dealt with.

The author has presented a very sound conception of the allergic state, or altered reactivity to varied substances in human beings. In all the cases an allergic basis is a common constant predisposing factor; this is generally inherited but may be acquired through tissue damage. In an individual possessing this predisposition the allergic symptoms are produced by the specific allergens; which are of an inhalant, ingestant, infectant, or injectant nature. The action of these specific allergens is, in most cases, stimulated by various non-specific non-allergenic causes. In some cases these non-specific causes may by themselves produce symptoms in a predisposed person.

There are certain statements in the text with which it is difficult to agree. For example on page 132 the author points out that from the statistical evidence he is forced to conclude that 'presence of active tuberculosis and asthma in the same patient is a rarity'. This statement is not only contrary to the reviewer's experience but is not entirely supported by the literature quoted by the author. On page 133 he quotes Manges and Hawley who found radiological evidence of tuberculosis in 18 per cent of 157 patients with asthma, Harkavy and Heheld who found x-ray evidence of pulmonary tuberculosis in 10 per cent of 400 patients with asthma, and Acton and Dharmendra who found evidence of tuberculosis in 15 out of the 79 cases of asthma with chronic lung damage. Again on page 191 the author asserts that 'the asthmatic syndrome generally occurs only in the presence of specific sensitization'. If this view were to be accepted a majority of cases of asthma amongst Indians would have to be classified under a different disease altogether, because it is in a minority of cases that specific sensitization is present.

These criticisms are, however, only expressions of a personal view-point and should not be taken as criticisms of the book as a whole. The author is one of the leading authorities on this subject and he has produced a book quite up to the very high standard of this unique 'Recent Advances' series.

D.

COMMON SKIN DISEASES.—By A. C. Roxburgh, M.A., M.D., B.Ch. (Cantab.), F.R.C.P. (Lond.). Second Edition. 1934. H. K. Lewis and Company Limited, London. Pp. xxxii plus 370, with 8 plates in colour and 128 illustrations in the text. Price, 16s.

THE fact that a second edition of this book has been called for within two years of its first appearance is evidence of its popularity, which in the reviewer's opinion is well merited.

The author has confined himself strictly to common skin diseases and has accordingly produced a handbook of great value to students and general practitioners. It is noted, however, that this edition has been slightly enlarged by the addition of several conditions omitted from the first. This we look on as a sign of robust health in this small book, and we hope that in subsequent editions it will continue to grow until it eventually reaches adult status in the form of a textbook of dermatology, for the author has a clear style of writing and presents his facts in an eminently practical manner which is well suited to the production of a larger book on the subject.

P. A. M.

THE PRINCIPLES AND PRACTICE OF NEUROLOGY.

—By A. Cannon, K.C.A., M.D., Ph.D., D.P.M., R.C.P.S. (Lond.), and E. D. T. Hayos, M.D., D.P.M., R.C.P. & S. (Lond.). 1934. William Heinemann (Medical Books) Limited, London. Pp. xx plus 333. Illustrated. Price, 25s.

THE 'Principles and Practice of Neurology' is an important and comprehensive work by several authors. Within the scope of 325 pages is collected an abundance of facts welded together with much skill into a well-balanced whole. The reader is most impressed by the mature judgment displayed by the authors. All the modern advances in knowledge on this subject have been carefully incorporated, and throughout there is the mark of great ability and a wide personal experience, which together with the literary quality of writing maintains the readers' interest.

The first 55 pages are devoted to clinical examination of the nervous system by Professor G. H. Monrad Krogh. In the next 270 pages follows a description of various nervous diseases, dealt with systematically from the point of view of ætiology, signs and symptoms, prognosis, course and treatment. The section on cerebral tumours could hardly be improved on in the allotted space. The description of the inflammatory diseases of the nervous system, pyogenic and non-pyogenic, is conspicuously full. The section on rare diseases showing neurological signs and symptoms is a very valuable addition.

This book should be read not only by neurologists but by general medical practitioners as well. As the book is meant by its authors to be of special value to students of psychology the psychiatric aspect of certain diseases has received rather detailed attention. The book is not over-burdened with illustrations which is an advantage, while those given are very helpful. The paper and printing are both excellent and it well deserves the reception accorded to it.

R. N. C.

AIDS TO PSYCHIATRY.—By W. S. Dawson, M.A., M.D. (Oxon.), F.R.C.P. (Lond.), D.P.M. Third Edition. 1934. Baillière, Tindall and Cox, London. Pp. vii plus 318. Price, 4s. 6d.

THIS little book has now passed into its third edition. As the author states in his preface to this edition, several sections have been rewritten and recent changes in the lunacy laws have received appropriate notice. Special sections are devoted to legal procedure in Scotland. One may deplore the somewhat inadequate treatment still accorded to convulsive seizures, especially in children, in view of the fact that the book is written partly to help the general practitioner. There are not many topics in general medicine on which the general practitioner is in greater need of instruction than the correct diagnosis and prognosis of 'fits' in children. Hence some reference to the work of Ewald Stier of Berlin, as well as to that of others, should at least have been made. Similarly, no mention is made of the important researches of Pavlov and Lashley, researches that seem likely to add very materially to our knowledge of the organic basis of mind. The author dismisses in a few

words the subject of the psycho-analysis of children thereby leaving the reader that is not acquainted with psycho-analysis in general with the impression that the psycho-analysis of children is a procedure identical with that of adults, when, as a matter of fact, the technique is wholly different. The reference to Dr. Morton Prince on page 275 might lead the reader to suppose that this eminent American psychiatrist is still living; very unfortunately for psychiatry he died some years ago. In spite of these minor defects the book is well adapted for either the medical student or for those who seek the Diploma of Psychological Medicine or other kindred degree.

O. B.-H.

HYPNOTISM IN THE TREATMENT OF DISEASES.—

By B. Layton Lloyd, M.B., D.P.H. 1934. John Bale, Sons and Danielsson, Limited, London. Pp. vii plus 44. Price, 3s. 6d.

IN this small booklet the author has put forward his reasons for the more extensive use of hypnotism in the treatment of diseases, particularly functional in origin, and in which emotions and psychical factors play the chief part. He goes so far as to say that he is able to produce deep hypnosis and a stage of anaesthesia. Under its influence he is able to perform operations such as opening of deep abscesses, extraction of teeth and even deep operations. By hypnotism he is able to differentiate between functional and organic disorders, since a functional disorder disappears after one or two sittings. The other diseases which can according to him be cured are paralysis, blindness, aphasia, amnesia, stammering, pain, pruritis, skin diseases, asthma, addiction habits, etc.

He suggests that research into the art of hypnotism will bring about a closer relationship between physiology and pharmacology more than the laboratory experiments have done. The basis of hypnotism treatment is that it influences the internal secretions of hormones and produces strong suggestions on the subconscious mind. Hypnotism is a very potent medium of treatment and therefore should be used more extensively in practice.

Whether one can accept all the assertions made by the author or not the book undoubtedly is interesting and is written in very simple and clear English. It would have been to the advantage of practitioners if the author had included a chapter on the practical methods of inducing hypnosis by hypnotic suggestion.

R. N. C.

Note.—We have been asked to publish the following note in regard to this book.—EDITOR, *I. M. G.*:—

CORRECTION

The statement on page 34 to the effect that a patient had eleven teeth filled at one sitting, under post-hypnotic anaesthesia, is not correct. I endeavoured to get in touch with the dentist before publication, but was not able to do so.

The dentist now confirms the statement that the anaesthesia was perfect, and that several fillings were below the margin of the gums, but adds that the fillings were done at several sittings.

This does not affect the principle; in fact it is a severer test for the patient to be able to go several times and get immediate and complete anaesthesia every time, than it would be if it only occurred once.

It is not easy to account for the patient's lack of precise knowledge; he knew he went several times, but thought the other visits were for scaling.

I can only assume that the anaesthesia was so complete that he could not tell what was being done.

This is the only statement of observed fact mentioned in the book which did not come under my personal supervision (I was present at the extractions), and although it does not alter the value of post-hypnotic anaesthesia, I am correcting this error at the

earliest possible moment because I will not tolerate inaccuracy.

B. L. L.

Oct. 12, 1934.

LECTURES ON MEDICAL ELECTRICITY.—By Elkin P. Cumberbatch, M.A., B.M. (Oxon.), D.M.R.E. (Camb.), F.R.C.P. (Lond.). 1934. Henry Kimpton, London. Pp. viii plus 236, with 38 illustrations. Price, 6s.

THIS little volume by such a well-known author needs no commendation from me. It is a somewhat novel departure in scientific literature being written in conversational style. Following each description of experimental procedure comes a short summary of the principles established. This helps, not only to fix important facts in the reader's memory, but affords to the student a rapid and easy way of revising the whole subject.

The author is noted for his clear and easy style. This little volume is no exception in this respect. It is easy and interesting reading. The numerous diagrams will help the student to understand the more difficult parts.

The whole subject of electro-therapy including the use of infra-red and ultra-violet rays is covered, so the volume will repay perusal by the expert, as well as by the student and general practitioner.

J. A. S.

DEVELOPMENTAL ANATOMY: A TEXTBOOK AND LABORATORY MANUAL OF EMBRYOLOGY.—By Leslie Brainerd Arey. Third Edition, Revised. 1934. W. B. Saunders Company, Philadelphia and London. Pp. 593, with 547 illustrations, many in colour. Price, 27s. 6d.

IN this edition of the book the general arrangement of the subject-matter remains the same as before. viz, Part I deals with general development, Part II with the development of the different systems according to their germ layer derivation and Part III is a laboratory manual for practical work on chick and pig embryos. Parts I and II have been thoroughly revised and rewritten in places in order to incorporate the most up-to-date information on the subject. The references at the end of each chapter will be of great use to inquiring readers. The description of the developmental anomalies makes the subject an interesting reading. One hundred and eighty-one new illustrations have been added making a total of 1,188 drawings which are very instructive. The utility of such an increased number of drawings in a book on embryology cannot be exaggerated. The author in his usual clear and lucid style has dealt with the complex developmental history which will be much appreciated by his readers. Part III which deals with the practical work on chick and pig embryos will be of immense help to students interested in practical embryology. The get-up of the book is excellent.

N. P.

PUBLIC HEALTH IN INDIA.—By N. R. Dharmavir, F.R.C.S.E., L.R.C.P.E., L.F.P.S.G.I., D.P.H. (Cantab.). 1934. Rama Krishna and Sons, Anarkali Street, Lahore. Pp. ix plus 361. Price, Rs. 3

THIS is not in any sense a textbook on public health, nor does it refer to India as a whole but only to the Punjab and then mainly to the city of Lahore. It is made up chiefly of a series of lectures and addresses on varied topics, such as food, excretal disposal, infant ailments, personal hygiene and public health administration. There is in consequence a good deal of overlapping and repetition. The author was born and brought up in the Punjab and, after taking his medical degree at Lahore, proceeded to England where he spent nearly 29 years in continuous medical practice, being at the same time health officer of a town in Lancashire. On his return to the Punjab

he has interested himself in the social, economic and health conditions of his native province. He seems to find these conditions worse than when he left them. His description of the city of Lahore 40 years ago, he finds, still stands as true as it was then. The climate has not changed either, and Kipling's tale of the 'City of Dreadful Night', we take it, would also still apply.

He attributes these unsatisfactory conditions of affairs on the one hand to the continued poverty, ignorance and conservatism of the masses, and on the other (so we would judge from his chapter on public health administration) to the indifference and 'un-practicableness' of the sanitary authorities. He does not exactly indicate how the inertia of centuries is to be moved, nor how the economic and living standards are to be raised, but we gather that the methods of Mustapha Kemal Pasha meet with his approval, and he would advise a vigorous and ruthless application of suitable mandatory laws and by-laws.

There are several chapters on nutrition and food. The author would divide the inhabitants of India roughly into two classes, those who cannot get enough to eat, and those who, having the means to obtain a sufficiency, eat too much. He is an enthusiastic vegetarian. The chapters on infant care are good; those on excretal disposal, water, etc., are on usual lines. The book merits attention by the obvious earnestness and enthusiasm of the author for the welfare and uplift of his compatriots in the Punjab.

A. D. S.

PRACTICAL HISTOLOGY FOR MEDICAL STUDENTS.—By D. T. Harris, M.P., D.Sc., F.Inst.P. Third Edition. 1934. H. K. Lewis and Company Limited, London. Pp. 36. Illustrated. Price, 7s. 6d.

THIS laboratory book is designed and compiled as a guide to medical students desirous of obtaining a systematic knowledge in practical histological work. All the tissues of common laboratory animals and also of human subjects have been fully dealt with. Special methods of fixation, technique of section-cutting and staining have been concisely but explicitly noted. The salient features of each specimen have been briefly indicated. Blank pages have been provided for rough sketches and drawings of the specimens studied and for supplementary notes. The comparative studies of histological structures of organs and tissues of lower animals and human beings have been well arranged and somewhat exhaustively carried out. The clear impressions which are thus formed on the students' minds of the minute normal structures of the body cannot easily be effaced and will surely form a sound basis for the further study of the pathological changes which may occur in them in disease. The plates on the types of blood cells and the microphotography of pig embryos are very instructive. The usefulness of such a laboratory manual for practical histological work cannot be overestimated. The book is strongly recommended as a constant companion to those medical students who want to learn thoroughly the important subject of normal histology which is a basis of modern medicine.

M. N. D.

THE DIABETIC LIFE: ITS CONTROL BY DIET AND INSULIN.—By R. D. Lawrence, M.A., M.D., F.R.C.P. (Lond.). Eighth Edition. 1934. J. and A. Churchill, Limited, London. Pp. x plus 224. Illustrated. Price, 8s. 6d.

THE fact that the book has gone through eight editions within 10 years is by itself convincing evidence of its popularity and that it has been translated into four different languages speaks volumes in respect of its usefulness.

No fundamental changes have been introduced in the present edition except that the *line ration scheme*

has been modified to provide the present-day method of 'higher carbohydrate and lower fat' system of dieting.

We have no hesitation in saying that the book will be found to be as useful as before.

J. P. B.

BIOCHEMICAL AND ALLIED RESEARCH IN INDIA.

Issued by the Indian Institute of Science, Bangalore

THIS booklet although it covers only 76 pages contains a most comprehensive survey of the recent work carried out in biochemistry and allied subjects in India. To give one an idea of the width of the field an enumeration of the chapters is illuminating; they are, enzymes, agricultural chemistry, chemistry and agricultural industries, foods and nutrition of farm animals, dairy chemistry, vegetable physiology, phytopathology, medicinal and pharmaceutical chemistry, progress of research on nutrition in India including work on vitamins, chemistry, biology and sanitation. Several aspects of research deserve special notice such as dairy farming, feeding of cattle, human nutrition and sanitation. There can be no question of the inestimable value of a good, cheap and plentiful milk supply. It is all to the good of the people of India that work should be done on the food values of land produce for milk cows. The final chapter on sanitation contains some practical information on the purification of a water supply by copper sulphate which has been carried out in Madras. The pamphlet should certainly be consulted by all those interested in the wide field covered by biochemistry in India to-day.

H. E. C. W.

HEALTH NOTES FOR YOUNG MEN OVERSEAS.

Published by the British Social Hygiene Council Incorporated, London. Pp. 34. Price, 4d.

THIS small pamphlet has been prepared by the British Social Hygiene Council with the intention that it should be given to young men proceeding overseas, especially to tea and rubber and other plantations. It is a small booklet enclosed in a stiff water- and insect-proof cover and its price is negligible. Though it is marked 'Health Notes for Young Men Overseas', its page title inside is 'Notes on the Venereal Diseases', and it deals entirely with these matters. The subject is dealt with in a straightforward manner and nowadays there can surely be no objection to this. The venereal diseases and their dangers are described and the importance of prevention and early treatment stressed. Methods of disinfection are described and their efficacy discussed. The booklet finishes up thus: 'It would seem, therefore, wise and expedient—however hard may be the circumstances—to decide to wait for the time when the sex impulse can be expressed in a marriage of affection, without the deceit, anxiety and danger of non-marital relations'.

Perhaps the dangers of the extra ounce of alcohol, as Col. Harrison calls it, which often throws prudence and good resolutions to the winds might have been stressed more. The words of the old servant Adam in 'As You Like It' might be oftener heard and acted on—

'For in my youth I never did apply
Hot and rebellious liquors in my blood
Nor did not with unbashful forehead woo
The means of weakness and debility'.

Every adult is the arbiter of his own conduct, but he should be forewarned and advised.

A. D. S.

Abstracts from Reports

A SURVEY OF Aedes MOSQUITOES IN BOMBAY AND THE MEASURES SUGGESTED FOR THEIR CONTROL. BY DR. R. K. MHATRE, L.M.&S. (BOM.), D.P.H., D.T.M.&H. (CANTAB.), OFFICER-IN-CHARGE, MALARIA BRANCH, PUBLIC HEALTH DEPARTMENT, BOMBAY MUNICIPALITY

IN view of the importance at present attached to the probable spread of yellow fever to India and other countries by aircraft the following abstract is of considerable historical interest showing that the public health authorities of over twenty years ago were no less alert than they are to-day, and it is interesting to note that Dr. Bentley the recently retired Director of Public Health of Bengal was one of the active participants in this early campaign.

PART I

Early history of protective measures against yellow fever

IN 1907 Sir Patrick Manson gave a warning about the possibility of yellow fever being introduced in the Eastern countries on completion of the Panama Canal. Real interest in this subject was, however, evoked in India by a paper read by Major Gordon Tucker, 'Yellow fever, India's future danger' before the Bombay branch of the British Medical Association in June 1910. It was anticipated that after the opening of the Panama Canal an increasing commerce would commence from and through the principal endemic centres of yellow fever to the seaports of China and the East.

Of the three endemic areas of yellow fever, Equatorial America, the West India Islands and a small part of

the West Coast of Africa, it was feared that yellow fever would be introduced into Eastern countries from Equatorial America and the West India Islands through the canal traffic.

Regarding the epidemiology of yellow fever, Gordon Tucker pointed out that it was essentially a disease of the warm climates and was chiefly restricted to seaports, the maximum prevalence of the disease following maximum temperature and latitude 22° north and south of the equator roughly covering its area of maximum intensity. He further stated that the key to the epidemiology of yellow fever, including its propagation, locality, seasonal variation and prevention, had been found in the virus's extra-corporal host—*Stegomyia fasciata*. On the authority of Dr. Bentley he stated that *Stegomyia fasciata* was of common occurrence in Bombay. Realizing that two of the three factors necessary for yellow fever epidemics, *Stegomyia fasciata* in abundance and a completely non-immune population being already available and having in view the possibility of the virus being admitted into any of the Eastern countries in the route mentioned in his paper, he gave a warning that we could not flatter ourselves that the risk of infection of Asiatic ports was 'very remote'.

In order that some steps should be taken to ward off the introduction of yellow fever into Eastern countries before the Panama Canal was opened for traffic and to cope with the disease in case it found its way into India, Gordon Tucker made the following suggestions, viz:—

(1) that an International Conference should be held for a campaign against *Stegomyia fasciata* in the centres where the disease was endemic;

(2) that medical officers should be encouraged to study the clinical side of the disease in its endemic area; and

(3) that the great ports of India such as Bombay and Calcutta should be entirely cleared of mosquitoes, so that if infection were to arrive it would find no carriers.

The Government of Bombay before submitting the matter for the information of the Government of India obtained the opinions of the Health Officer of the Port of Bombay and the Sanitary Commissioner for the Government of Bombay.

Lieutenant-Colonel Jennings, Health Officer of the Port of Bombay, suggested the following as the only practical measures which were likely to minimize or avert the danger:—

(1) The rendering of all vessels calling at or starting from infected ports mosquito free.

(2) The use of curtains and mosquito proofing of doors and other openings in cabins.

(3) Vigorous measures to exterminate mosquitoes in ports in which the disease was endemic.

(4) A constant campaign against mosquitoes along the proposed canal and particularly at the ports at either end thereof.

(5) Inspection at definite ports on the main line of route with a view to protecting suspicious cases from bites of mosquitoes (there being no fear in the case of well-established cases, as the virus existed in the peripheral blood during the first three days of the attack).

(6) A campaign against mosquitoes at all ports along the line of route and in India.

(7) The preparation of a protective vaccine.

(8) Experiments to discover some means of anointing the skin which will be protective against mosquitoes.

Lieutenant-Colonel Dyson, Sanitary Commissioner for the Government of Bombay, maintained that defensive measures against the introduction of yellow fever would be too irksome and expensive, and by no means reliable and advocated a direct attack on the disease in its endemic homes. In furtherance of this object, the first step suggested by him was the formation of a Convention of the Powers concerned, not for the purpose of legislating for the sanitary control of shipping coming from infected ports, nor for the protection of threatened ports, but with a view to organizing and financing a campaign against yellow fever in the endemic areas.

In March 1911 the matter was referred to the Government of India who replied that they fully realized the importance of the matter and that they intended, with the sanction of the Secretary of State, to depute Major S. P. James to attend the International Conference on the subject held at Hongkong in January 1912, and from there to study the disease in the endemic area. They also agreed with the Bombay Government that it was desirable that medical officers should be encouraged to study the clinical aspects of the disease in the endemic area.

Major James submitted his report to the Government of India in 1913. A copy of the report was received by the President, Bombay Municipal Corporation, in May 1913, through the Government of Bombay. This report dealt mainly with the measures to be taken outside India. The recommendations in regard to these measures were:—

(1) Appointment of medical officers as intelligence officers in ports outside India.

(2) Institution of scientific enquiries under the auspices of the Royal Society.

(3) Establishment of a Central Intelligence Bureau.

(4) A modern quarantine station at Hongkong.

(5) Port Health rules regarding yellow fever to be brought into line with modern knowledge and arrangements made for the destruction of mosquitoes on ships.

These recommendations being primarily of Imperial concern, the Government of India addressed the Secretary of State on the subject and requested him to take the necessary steps.

As regards India itself, James made the following recommendations, viz:—

(1) The systematic investigation in India of the *Stegomyia* problem according to a definite scheme and the continuous improvement and extension of further constant water supplies.

(2) An enquiry into the possibility of the spread of the disease to India by way of the Cape of Good Hope.

In regard to the proposal for a systematic investigation in India of the *Stegomyia* problem, James submitted at the same time a 'Note on the practicability of *Stegomyia* reduction in Indian seaports'. From his observations it seemed clear to him that the key to the problem of reducing *Stegomyia* mosquitoes in Indian seaports lay in the water supply. Although all the seaports which he had examined were provided with a piped water supply, there was not one in which the arrangements were such as to obviate the necessity of water storage in houses, and the receptacles used for such storage were the chief breeding places of *Stegomyia fasciata*. In Bombay the supply was intermittent and the pressure was insufficient to provide a tap supply in the upper storeys of the houses. There were usually three or four storage cisterns in each of the larger houses, one being on the roof, the others often in dark inaccessible corners under staircases. On the ground floor there was often a stone reservoir and nearly always a well. Smaller receptacles for storing water were numerous. Cisterns erected on the pavements for the purpose of supplying the road-watering carts were also a prominent feature of the city.

The remedy suggested by him for overcoming the necessity of storing water in houses was the provision of a constant high pressure water supply, and this measure was, in his view, the first step that should be taken in any attempt to reduce *Stegomyia fasciata* in our seaports.

Later on, in 1916, Lieutenant-Colonel Jennings, Health Officer of the Port of Bombay, in his report on the Indian Ports Act with reference to the precautions to be taken at Bombay against yellow fever, recommended, in view of the many interests involved, and of the fact that the arrangements would have to be permanent, that the whole question be referred for report to a select committee.

The Government of Bombay approved of the suggestion made by the Port Health Officer that a committee should be appointed to consider the arrangements to be made for a site and accommodation for the isolation of the passengers and crews subjected to surveillance under Rule 32 of the Port Rules relating to yellow fever, and the committee which was appointed was asked to report within two months.

The Government of India deputed Major Christophers in December 1919 to investigate the prevalence of *Stegomyia* mosquitoes in the neighbourhood of all possible land sites for a quarantine station, prior to the consideration of the subject by a technical advisory committee.

This committee, appointed by Government order, submitted a report on 15th December, 1919, which was based on the recommendations made by Major Christophers regarding a suitable place for the quarantine station.

In February 1920 the Government of India summoned a committee at Calcutta to consider measures for the prevention of yellow fever in India. The policy to be pursued in connection with this was based upon:—

(1) precautions outside India;

(2) the protection of the principal Indian ports from infection by—

(a) the extermination of *Stegomyia* mosquitoes;

(b) the imposition of a strict system of modified quarantine.

Dr. K. E. Dadachanji, a representative of the Bombay Municipal Corporation, was appointed on the committee. The following were some of the important conclusions arrived at by the committee:—

(1) The prevalence of the mosquito *Stegomyia fasciata*, which transmits the yellow fever virus, and the existence of a susceptible population in the chief seaports of India indicate that the introduction of this disease might be followed by sudden virulent outbreaks.

(2) *Stegomyia fasciata* is present in India as in almost all maritime regions situated within the parallel 40° N. and 40° S. and all ports within such limits must be regarded in the present state of our knowledge as liable in varying degree to introduction of the disease and its dissemination.

(3) The committee is of opinion that the existing arrangements in the main ports of India are wholly inadequate to prevent the introduction of dangerous epidemic diseases and considers that at each of the important ports of ocean call a sanitary station should be established.

(4) The committee is of opinion that no possible advantage is to be gained from the establishment of sanitary stations on islands distant from the ports they have to serve.

(5) In recommending sites for sanitary stations the committee finds, in the case of Bombay, Butcher Island as the one site satisfying all requirements of such a station.

(6) In addition to the five main ports, there are on the coast line of India some 196 ports, 104 of which are in the Madras Presidency and 75 in the Bombay Presidency. In the case of some of these ports, vessels, the majority of which appear to be sailing ships, trade with ports in the Straits Settlements and in East Africa. The committee recommends that a sanitary survey of these ports, including accurate information relating to the trade relations of each, and mosquito infestation be made at an early date. It will be then possible to decide to what extent these ports contribute to the risk of the introduction of dangerous epidemic diseases, especially yellow fever, to India, and what measures are necessary to meet such danger.

(7) The committee is of opinion that the most effective method of protecting the ports of India from yellow fever is to keep them as free as possible from *Stegomyia* mosquitoes, and that it is undesirable to separate the work required for the reduction of *Stegomyia* from that of mosquito reduction generally. Mosquito control can be carried out by a properly directed organization working under a legally constituted sanitary authority. The committee therefore recommends that Government legislate:—

(1) to appoint a sanitary authority for each port;

(2) to establish a properly directed organization for the control of mosquitoes in each of the larger seaport towns;

(3) to provide for contributions from Government revenues towards the cost of these schemes;

(4) to secure the efficient carrying out of these measures in the event of failure on the part of the local authority.

For the sake of efficiency as well as economy it is desirable that adjoining local authorities should prepare a conjoint scheme.

After these resolutions of the committee were passed in 1920, nothing particularly interesting appears to have happened in regard to these recommendations until now.

An enquiry was made in 1927 by the Executive Health Officer, Bombay, as regards the progress made since 1920 with the Trans-Continental Railway in Africa and, in connection with this, the Public Health Commissioner with the Government of India obtained the necessary information from the Colonial Office, London. It was stated that no project for the construction of a railway across Africa was engaging the attention of the Government of any British Colony or Protectorate in Africa.

The Colonial Office added that it might be interesting to know, with regard to the general question of the protection of India against yellow fever and other dangerous epidemic diseases, that the question of yellow fever in West Africa was being studied by a commission organized by the International Health Board and that this commission had been at work in West Africa since May 1925.

Since 1927 the Municipal Commissioner, Bombay, has been writing to the Bombay Government almost every year enquiring whether any progress has been made with the establishment of a sanitary station in Bombay and in the carrying out of the other recommendations made by the committee appointed by the Government of India to consider the question of preventive measures against the importation of yellow fever into India.

The last communication to this effect was made in February 1933 to which a reply was received that the Government of India had not passed any orders as regards the establishment of a port quarantine station in Bombay, as the question was linked with the general question of the administration of major ports on which no decision had been arrived at by that Government. Similar replies had been received to the previous communications.

Further development in regard to this subject was evinced at the Regional Health Conference of the League of Nations held at Cape Town in November 1932. One of the principal subjects discussed was the prevention of the spread of yellow fever. India was represented at this Conference by Major-General J. W. Graham, Public Health Commissioner with the Government of India, who submitted a report of the work done at the Conference. According to him, it was agreed at the Conference that further *Aedes* survey work was desirable, and that considerably more active *Aedes* control should be undertaken than is at present the case at points in infectable countries which may be considered to be particularly vulnerable to the introduction of yellow fever infection.

The object of tracing this history is to obtain a clear idea about the several recommendations made in regard to the adoption of preventive measures against yellow fever since the note of warning was sounded in 1907 by Manson and to know how we stand at present as regards the protection of Bombay and other seaports against the importation of the disease. The history of the events recorded above shows that Bombay and incidentally the whole country is in exactly the same unprotected state against the disease to-day as it was a quarter of a century ago. Luckily the virus of the disease has not up to now been introduced into the East.

Part II is devoted to the present position and the following abstracts will be seen to contain useful information regarding dangerous places, distances, and times of air travel in Africa.

Within the last few years the situation in regard to communication between West and East Africa has been greatly altered owing to the modern development of mechanical transport. It is possible now to cross the country from West to East by air, rail or motor car. It is said that motor tours from West to East Africa and back are being advertised. By any of these means of transport the journey from an endemic area of yellow fever in West Africa to an East African seaport can be completed within the incubation period of the disease. The incubation period of yellow fever in man is from three to six days, and he is infective to the mosquito during the first three days of his illness. Thus a person contracting the infection in West Africa may at any time land in any of the seaports on the East coast during the incubation period and develop the disease there. If the infection of yellow fever spreads in this way from its natural home in West Africa to the East coast, the favourable conditions for its dissemination existing in the seaports will lead to epidemics. Once the disease is firmly established on

investigation in regard to the action of venoms and, particularly, anavenoms.

SUMMARY OF THE REPORT ON THE SESSION OF THE OFFICE INTERNATIONAL D'HYGIENE PUBLIQUE HELD IN PARIS, 30TH APRIL TO 9TH MAY, 1934, BY LIEUT.-COLONEL J. TAYLOR, D.S.O., M.D., D.P.H., I.M.S., DIRECTOR, CENTRAL RESEARCH INSTITUTE, KASALI, AND DELEGATE FOR THE GOVERNMENT OF INDIA

The session was a very active one and accomplished work of high value. The problems in which India was specially interested received detailed attention and the results of the discussions will assist in settling several questions which were put before the committee.

The report of the Quarantine Commission on the alleged importation of plague into Peru by the agency of jute cargoes from Calcutta should assist in the removal of the restrictions on such cargoes which have been imposed by the government of that country.

The opinions on the suitability of oral vaccine for the prevention of cholera during the pilgrimage, which were expressed by the committee, indicate that this method will not be acceptable. The report on the use of single-dose inoculation with cholera vaccine and the dosage to be employed shows that the methods recommended are in exact accordance with the practice and experience in India.

The countries which had formerly adopted varying periods for vaccination against smallpox and cholera have now conformed to the terms of the International Sanitary Convention for Aerial Navigation with the exception of Persia whose intentions are not yet known.

The subject of preparation of a standard cholera diagnostic serum has now advanced to a stage at which it is considered that further work on the subject can only be effectively carried out in countries such as India where facilities exist for conducting investigations during the presence of epidemics and great reliance is placed on India to continue investigations on this point and in other matters in regard to cholera. Lines of work have been suggested.

A question of considerable importance has been raised on the interpretation of the terms of Article 38 of Section II of the Aerial Convention in relation to areas in which mouse protection tests have shown immunity to yellow fever while no cases of the disease have been recognized. The attitude of countries towards aeroplanes coming from such areas will require to be considered in the event of anti-amaryl aerodromes not being provided in these areas.

The recommendations of the committee on standards for fumigation with sulphur will form a valuable guide to the practical application of this method.

The revision of the 'personal card' for the treatment of venereal diseases in seamen will ensure a greater regularity in treatment.

The communications on technical subjects presented are of high value to workers in special subjects.

THIRTY-FIRST ANNUAL REPORT OF THE BUREAU OF SCIENCE, PHILIPPINE ISLANDS, FOR THE YEAR ENDING 31ST DECEMBER, 1932. BY WILLIAM H. BROWN, DIRECTOR OF THE BUREAU OF SCIENCE

Good progress was made during the year along various lines of research, in spite of the greatly reduced appropriation. Perhaps the most important investigations were those on rice bran and mango blossom blight. The work on rice bran, which was mentioned in my previous report, is now largely completed, and it has been found that rice bran is very nutritious and has an excellent vitamin content, being superior in these respects to wheat bread or rice. It can be cooked in a great variety of ways such as bread, cookies, and breakfast cereal. This

bran should prove to be an exceedingly valuable food in rice-producing countries and its judicious use would go far toward eliminating beri-beri, which is a terrible affliction in all regions where polished rice is consumed.

In the Philippines mango trees bear fruit rather scantily on account of the attack of leaf hoppers which cause mango blossom blight. It has been found possible to control this blight easily and cheaply and to produce good crops of fruit. This investigation should make it possible to produce mangoes in such quantities and at a price which is low enough so that they can be preserved commercially in various ways.

Medical biology.—The distribution, transmission, immunity, hæmatology, and treatment of rat-bite fever in Manila was investigated. The cases of rat-bite fever which were registered in 1931 and those of bubonic plague during the years 1912 to 1914 had practically the same distribution in Manila.

Doctor Garcia and Miss Rita Villaamil continued the work initiated by Dr. Otto Schobl on the purification of the antidyenteric serum prepared in the serum laboratory of the Bureau of Science with the view of eliminating the anaphylactic effects which sometimes follow the use of the unpurified serum. The results so far obtained are encouraging.

Organic chemistry.—Philippine soybean and talisay oils were investigated. The results showed that these were edible oils of high quality. The fatty oil from different varieties of rice was also investigated. The results showed these rice oils were also edible oils of high quality.

Food preservation.—Work was continued on methods of using soya bean in the Filipino diet and many suitable dishes were devised, and a very large number of recipes for the use of rice bran were prepared. A considerable number of native fruits were preserved by the freezing method. Mangoes proved unusually well adapted to this method, and are already being prepared in this way on a commercial scale and find a ready market. A number of fruits were candied and prove to be very popular. Particularly good were preparations made from mangoes and papaya. In addition to candies, a considerable number of products with commercial possibilities were made from green papaya. These include imitation apple sauce, imitation apple butter, and papaya sauer kraut. A large number of fruits and vegetables were dehydrated successfully while excellent juices were prepared from a lot of others. Some of these have distinct commercial possibilities. Many popular native dishes were successfully canned.

Experiments by Dr. Russell with avian malaria demonstrated that plasmochin will not prevent the infection of birds with the sporozoites of malaria. These experiments and those of 1931 have shown quite clearly that plasmochin is an excellent therapeutic drug but that it has no direct lethal effect on the infective sporozoites as they are injected into the blood stream by a mosquito.

Want of space prevents us abstracting further from this interesting report. We have limited our abstract to matters of medical interest only but practically every branch of human activity is dealt with in this bureau so that persons interested in such widely differing subjects as railroad construction, chemistry, zoology, and all aspects of public health (to mention only a few branches) will find information of value.

ANNUAL REPORT ON THE WORKING OF THE ASSAM MENTAL HOSPITAL, TEZPUR, FOR THE YEAR 1933. BY COLONEL J. P. CAMERON, C.S.I., C.I.E., V.H.S., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, ASSAM

Dr. Chowdhury underwent special training for six months at the Ranchi Mental Hospital prior to assuming charge as whole-time medical superintendent of the Tezpur Mental Hospital.

The Civil Surgeon, Darrang, now acts as consultant to the hospital.

The number of inmates remaining at the end of the year 1932 was 628, of whom 523 were males and 105 females. During the year under review 153 patients (131 males and 19 females) were admitted, including eight re-admissions, all of whom were males. The total number of patients treated during the year was, therefore, 781 (657 males and 124 females) as against 18 (601 males and 117 females) in 1932.

Of this number, 70 were discharged 'cured', 11 discharged as 'improved', 1 discharged as 'not improved' and 22 died, leaving 677 at the end of the year.

The percentages of recoveries calculated on the daily average strength was 10.79 against 4.77 in 1932. Thirty-nine cases of alleged lunacy were admitted during the year, including 3 re-admissions, for observation and 2 cases were carried forward from the previous year; of these 26 were certified insane.

Cultivators and tea garden coolies furnished the greatest number of admissions.

There were 22 deaths during the year under review against 52 in 1932. This gives a death rate of 3.39

the daily average strength against 8.53 in 1932 which is very satisfactory.

The chief causes of death were dysentery and tuberculosis, the former disease being responsible for 14 deaths and the latter for 10.

Encouraging results were obtained by the use of prophylactic dysentery bilivaccine, which was administered to all the inmates.

Special accommodation is available for patients suffering from tuberculosis, so that complete segregation can be effected.

Male patients are employed on cultivation of vegetables and sugar-cane, manufacture of *gur*, jute, fencing of garden land, cane and bamboo works, carpentry, masonry and the usual domestic services. Females are employed on paddy husking, preparation of spices, mending clothes and other household works. Weaving is done by both male and female patients.

The special methods of treatment adopted were hydrotherapy, special dieting—including artificial feeding in cases exhibiting active refusal of food—occupational therapy, organotherapy and a trial of sulfoxin in a few cases of dementia praecox.

The hospital garden continues to do well, yielding some profit and a useful addition to the dietary.

The accommodation available at the end of the year, including all types of ward cells and infirmaries, was for 566 males and 124 females—or a total of 690.

The maximum number confined in any one night during the year was 684 against 634 in 1932.

The health of the inmates was satisfactory during the year and the sick and mortality rates compare favourably with those of the previous year. The usual prophylactic measures were adopted against smallpox, dysentery and cholera.

The superintendent has again put forward proposals for additional establishment. One temporary clerk has been sanctioned recently, but the request for additional keepers (10 males and 3 females) has not been sanctioned. To avoid recourse to mechanical restraint it is essential for this additional establishment to be provided.

The institution was successfully managed during the year by Dr. Chowdhury and his staff, and the health statistics go to show that the medical supervision was very satisfactory.

THE FOURTEENTH ANNUAL REPORT OF THE
BLIND RELIEF ASSOCIATION, BIJAPUR, 1933.
BY R. V. MONE, M.R.C.S., D.T.M., B.M.S. CLASS
I, CIVIL SURGEON, AND CHAIRMAN, BLIND
RELIEF ASSOCIATION, BIJAPUR

We have pleasure in once again drawing attention to the valuable work being done by this association, which is clearly indicated in the abstract below.

Those persons interested may obtain copies of this report and send subscriptions to the Civil Surgeon and Chairman, Blind Relief Association, Bijapur (M. & S. M. Railway).

Medical staff.—The association has two subordinate medical officers. Both work under the civil surgeon who is also the chairman of the managing committee of the association and does some portion of the operative work at headquarters. Both are Government servants kindly lent to the association.

During the year the touring medical officer paid on an average four visits to each taluka, the maximum being six and the minimum three in different groups of villages, inspected and examined the work of field workers and operated on suitable cases in suitable places. He had fifteen operation camps collecting such operation cases as were unable to go to the civil hospital. He was given greater facilities this year and owing to financial stringency he had to perform operations which could be conveniently tackled by him in camps and taluka places while on tour. This has saved the association travelling expenses and diet money required to be spent on patients brought to headquarters till about six months ago. The touring medical officer also visited Akalkot state and the state authorities have to be specially thanked for the facilities given by them to him when camping in the state. We cannot but mention here of the benevolent attitude of Her Highness the Dowager Rani Saheb, the state darbar and the authorities in the state for their generous grant which has enabled the association to entertain a special field worker for its work in the state.

Field workers.—There are eleven field workers employed by the association.

The association also carried on its work in Jath, Jamkhandi and Ramdurg states for some time but owing to financial stringency and non-receipt of grants from them it had to discontinue its work in these states.

The field workers have been specially trained at the headquarters in elementary diseases of the eye and its appendages by the medical officer in sub-charge of the eye wing. They know how to handle cases, wash the eyes and apply some remedies. While under training they get a good working knowledge of the various common eye diseases and know exactly when a case is serious and when a patient should be sent to hospital.

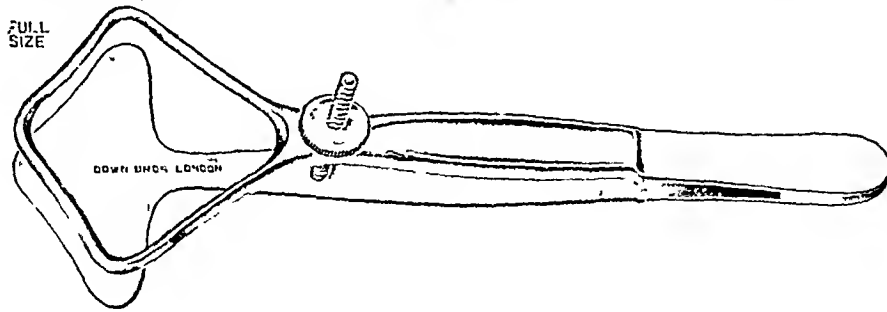
They have to tour round the number of villages given in their charge and maintain a pony for the purpose. They are supplied with a medicine chest containing, among other things, solutions of silver nitrate of different strengths, boric acid, sodium chloride, mercury ointment, argyrol, a bowl and a tray and some cotton-wool to wash the eyes.

They maintain a register in every village showing the names of all cases treated by them at every visit. The number of new cases treated by them during the year came to 15,820, and the number of repeated treatments was 3,651. Besides these a separate account of the more chronic cases requiring repeated treatments for a fairly long time, such as blepharitis and trachoma, and the number of treatments adopted in such cases for the first time came to 4,264 and that of repeated treatments to 7,614. Of these 2,346 were on school children. These figures clearly show what a large amount of work is being carried out in the district.

The field workers inspect the eyes of newborn children. The number of infants so inspected from house to house during the year under report for the first time, within ten days of birth, was 3,223 and that of repeated inspections within ten days was 585. The number of infants inspected ten days after birth, for the first time, was 23,353 and that of repeated visits after this, up to one year of age, was 39,036. The actual number of ophthalmia neonatorum cases found and treated during the year under report was only six

SPENCER FORCEPS

DR. GORDON SPENCER writes:—'When operating for entropion I found that Ratnaker's forceps could not be used in a large number of cases because of their prominent apex, which, owing to the atrophy which occurs at the fornix of trachomatous cases, rendered their proper adjustment impossible. I therefore had a pair of forceps made with the triangular portion much reduced and made round instead of triangular.'



These forceps again were not satisfactory because when they were adjusted and screwed up it was impossible, when putting in the stitches after having performed Snellen's operation, to bring the needle out below the ciliary margin.

Messrs. Down Brothers then made to my design the forceps illustrated above.

These forceps have the following advantages:—

1. The rounded blade enables them to be fitted into any eye no matter how small the conjunctival sac.

2. Access is obtainable into the extreme angles of the lid usually the points of most marked entropion. A much longer incision can be made than if Snellen's or Desmarre's forceps are used.

3. The instrument can be used for either eye so that only one forceps is necessary and not two.

4. Bleeding is as satisfactorily controlled as by the use of any other forceps, and there is no interference with the needle in putting in any form of stitches.

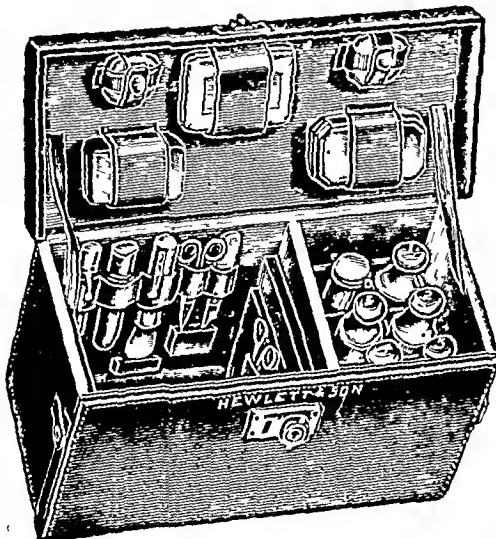
5. The instrument can be used for any operation on the lid for which the other forms of forceps are applicable, *i.e.*, Heisricht's, etc.

6. The forceps are made in several sizes so that they can be used for lids of different sizes.

The forceps have now been used for over 1,000 entropion operations and have proved entirely satisfactory.

THE 'COMPLETE G. P.' BAG

THE exigency of modern practice demands of the doctor, when visiting a case, a complete armamentarium



for dealing with emergencies and for providing urgent treatment.

This bag has been designed and used for three years by a doctor with a large mixed practice. In its present form it embodies the results of his experience as to the essential requirements necessary to obviate delay. It is of compact size and easily carried, yet containing a full equipment.

This bag is so arranged that every item is immediately visible and accessible the moment the lid is lifted. This object is achieved by the bag being made

to open at the top and to be used in the upright position as it is carried. The front of the bag need only be let down to get at the compartment holding the emergency dressing, etc. No spilling or disorder can occur, there being a definite place for everything provided. The large central space is to hold the folding stethoscope, and room is left for further instruments, such as a sphygmomanometer.

The measurements of the bag are 13½ inches by 6½ inches by 9 inches.

It is manufactured by Messrs. C. J. Hewlett and Son, Ltd., 35 to 42, Charlotte Street, London, E.C.2 and the price is very reasonable.

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Original Articles

CORNEAL TRANSPLANTATION ON OPAQUE CORNEAS*

By E. O'G. KIRWAN, F.R.C.S.I.

LIEUTENANT-COLONEL, I.M.S.

Professor of Ophthalmology, Medical College Hospitals, Calcutta

THE operation of keratoplasty is not new; it was attempted quite frequently in the past, but with very disappointing results. The first successful case was reported by Zinn in 1906, but successes have been very few.

In recent years, with the improvement in technique, corneal transplantation has aroused more enthusiasm as a number of successful cases have been reported by Elschnig in Prague and Tudor Thomas in England.

Various methods of procedure have been described. The lamellar and total keratoplasties have now been discarded, and the partial penetrating graft is the only one left.

DURING the months of December and January the hole press in which the *Indian Medical Gazette* is printed was moved to a new building. In these circumstances the editor feels that the printers have earned our congratulations rather than our censure by bringing out the January and February numbers each only one week later than the usual date. Next month we hope that we shall be able to return to our normal date of publication, i.e., the 10th of the month.

aqueous escapes, the trephine is laid aside and the attached portion of the graft removed with a fine pair of scissors. It is better not actually to remove the graft until the eye of the receiver is ready for its reception. The trephine used on the eye of the receiver should be a little larger than that used on the eye of the donor. The trephines used by me are 4 millimetres and 5 millimetres in diameter respectively.

The excised graft is lifted with a spatula or on the scissors from one eye to the other and great care should be exercised that it is not bruised. The less the manipulation of the graft, the less will be the haziness of the cornea, and the greater the ultimate success. The importance of placing the graft in the proper position with the corneal epithelium uppermost need hardly be pointed out. It is better to put the silk sutures which are to retain the graft before trephining the opaque cornea. Two silk sutures are inserted in a cartwheel form and tightened up when the graft is in position.

paper read at the meeting of the British Medical Association held in the School of Tropical Medicine, Calcutta, on the 9th November, 1934.

There is no necessity to put anything between the graft and the stitches.

On completion of the operation, sterile liquid paraffin drops are instilled into the conjunctival sac and both eyes bandaged. The patient must be kept in the recumbent position, the eye that was operated upon is opened on the third morning, atropine drops instilled, and both eyes kept bandaged for a week. The stitches are removed on the fourth day. At the end of a week the other eye is allowed to remain open and the patient permitted to sit up. It is better to keep the affected eye bandaged for three weeks.

Indications

The most favourable cases for operation are the corneas that show dense scars after interstitial keratitis. Congenital syphilis is usually the cause, but before keratoplasty is carried out vigorous treatment with arsenic and bismuth for at least one year must be given. It is not necessary to wait till the Wassermann reaction is negative, as this may remain positive for years in spite of treatment. Every effort

should also be made to clear the cornea as far as possible by the application of yellow mercuric iodine and dionine ointments. Keratoplasty is also indicated in the case of corneal opacity resulting from burns or ulceration, but should not be done sooner than one year after inflammation in the cornea has subsided. It should not, however, be carried out in cases of glaucoma. It is not advisable in children, as anaesthesia under local anaesthesia is not possible; the patient will not keep quiet.

Before operation is advised, great care should be taken to find out that there is good perception and projection of light and by transillumination to ascertain that there are no anterior or posterior synechiae.

The graft

This can be taken from the eye of a young or old person, with a normal cornea. It is immaterial whether the other parts of the eyeball have pathologically altered, or whether the eye has glaucoma or hypertension. It is advisable, but not essential, for the donor and the receiver to belong to the same blood group. As a rule, a slight haziness of the graft occurs during the first week after operation. This clears up usually in the second or third week. After four weeks one will usually know whether the cloudiness is permanent or not; permanency is evidenced by the appearance of vascularization in the implant. In successful cases, a ring of thick scar tissue is formed in the first few weeks after operation around the circumference of the graft. The periphery of the cornea in many cases often clears up tremendously as a result apparently of the graft setting up a biologic irritation. This more often occurs in cases of scars caused by interstitial keratitis,

A graft that remains clear for six weeks, according to Elschmig, never becomes opaque.

Summary

Keratoplasty or corneal transplantation is a very important part of plastic surgery, especially in India where blindness is so common from scars the result of interstitial keratitis and ulcers of the cornea. One has only to visit the outpatient department of the Eye Infirmary, Medical College, Calcutta, to appreciate this.

The operation is not difficult and the results are full of promise, provided that the minutest details in the technique are adhered to, and bearing in mind that success depends entirely on preserving the transparency of the delicate graft.

The following two cases of corneal transplantation on opaque corneas recently performed by me are described below :—

Case 1.—P. D., a Hindu girl, aged 16 years.

Previous history.—About four years ago, the girl developed a severe form of interstitial keratitis in both eyes and received a prolonged course of anti-syphilitic treatment.

The patient was admitted into hospital on the 5th July, 1934, with total loss of vision in both eyes.

General condition.—There are the characteristic signs of congenital syphilis present such as marked frontal bosses, Hutchinson's teeth, and depressed bridge of the nose. The Wassermann reaction was now negative.

Right eye.—The cornea was scattered with patches of opacities which involved the deep layers. The pupil could be seen clearly, there was evidence of old iritis and the lens was cataractous. The cataract was removed, the posterior capsule needled, and the vision was improved up to 5/60 with glasses.

Left eye.—The whole of the cornea was opaque and nothing of the deeper structures below could be seen. The vision was—perception and projection of light only.

The left eye was chosen for the keratoplasty as there was no area of clear cornea. The operation was carried out on the 24th September. The graft was taken from the cornea of a man of 25 years whose left eye had to be enucleated as a result of a penetrating injury near the limbus. Later, the eye developed iridocyclitis and was now totally blind and painful. When the eye was being removed, the wound gaped, there was an escape of vitreous and, as a result, the eyeball became soft. This added to the difficulty of taking a corneal graft from the eye.

A graft of the whole thickness of the cornea was then removed with a trephine of 4 millimetres diameter, the margins being cut shelving, the remainder of the graft being separated by excision with the scissors. A few drops of sterile warm liquid paraffin were then put on the graft which was not disturbed from its original position. The eye of the receiver was next anaesthetized with cocaine, and, after preliminary sterilization of the conjunctival sac, a circular hole with a 5-millimetre trephine was made on the opaque cornea over the centre of the pupillary area. It will be noted that this trephine was one millimetre bigger than the trephine used to remove the graft. After removal of the opaque disc, it was found that the lens was cataractous and there was much pigment deposit on the anterior capsule of the lens. The graft was then removed from the donor and placed in position and fitted excellently. The graft was kept in position by cross-stitches arranged

(Continued at foot of next column)

ON THE RELATIONSHIP BETWEEN THE QUININE CONCENTRATION IN THE CIRCULATING BLOOD AND PARASITE COUNT IN MONKEY MALARIA

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INTRODUCTION

In a previous paper Chopra, Roy and Das Gupta (1934) reported the results of their

(Continued from previous column)

in a cartwheel fashion. The stitches were removed six days after the operation when it was found that the graft had taken well and appeared to be quite clear. There was very little reaction of the eye after the operation.

A month after the operation the graft was found to be well in position. Examination with the corneal microscope showed a haziness in the deeper layers, but there was no difficulty in seeing the outline of the pupil and the cataractous lens. There was a well-established anterior chamber. The patient states that she can see daylight brighter than before. It is now hoped to do an iridectomy followed by removal of the lens, and I have every hope that her vision will be improved.

Case 2.—N. G., a Hindu girl, aged 20 years (see plate I).

Previous history.—About two years ago the girl developed an attack of interstitial keratitis in the right eye. She had early anti-syphilitic treatment and the left eye was not involved.

Condition on admission.—The patient was admitted into hospital on the 18th September, 1934, complaining of total loss of vision in the right eye, resulting from the previous inflammation. The Wassermann reaction was found to be negative.

Right eye.—The whole of the cornea was opaque, the iris and pupil could not be seen, the tension was normal, the vision—finger movements only.

Left eye.—The cornea was clear, the pupil active, tension and vision normal.

Treatment.—Keratoplasty on the right eye was carried out on the 5th October. Difficulty was found in obtaining a proper donor and, as the girl was anxious to leave hospital, the graft had to be taken from an old man, aged 80 years, whose eye was removed for absolute glaucoma associated with great pain. The technique of the operation was the same as described in the previous case. When the opaque disc was removed, the pupil was found to be dilated, the lens was present and was seen to be quite clear. The stitches were removed six days after operation, the graft was found to be lying in a good position, flat with the surface of the cornea and was quite transparent. A month after the operation the graft had changed little.

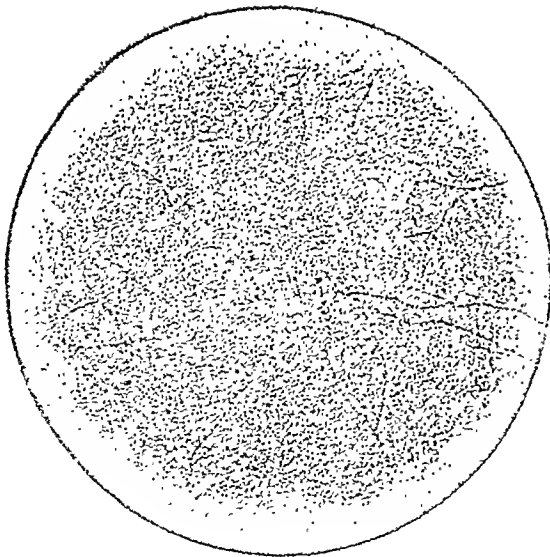
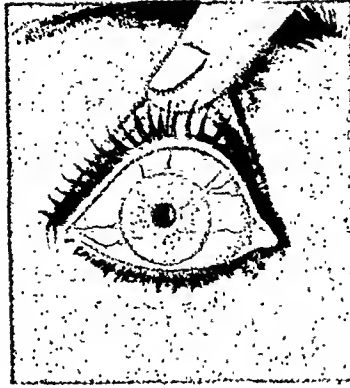
On 5th November the patient's vision was 6/60; she could count fingers from the other end of the room and could read large print.

Examination with the corneal microscope.—On the same date the pupil and the surrounding iris could be easily seen; there was evidence of old iritis in the form of pigment spots on the anterior capsule of the lens. There were no blood vessels to be seen in the graft.

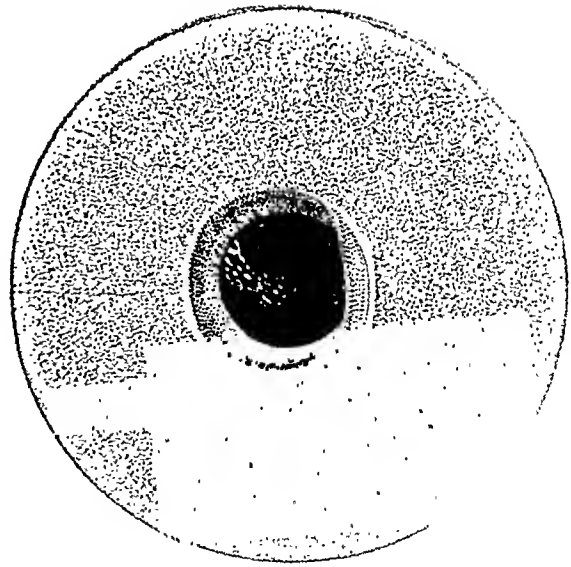
This case is remarkable in the fact that the corneal transplantation was taken from a donor of 80 years of age, and it is also of interest to note that he belonged to a different blood group.

PLATE I.

Case No. 2.



Before Operation.



After Operation.

investigation on the concentration of quinine attained in the blood at different intervals of time after administration of the drug by the oral, intramuscular and intravenous routes. They showed that the concentration of quinine in the blood after administration by these different channels runs almost parallel. Taking the average of all estimations the maximum concentration in the blood was found after 15 minutes, both following intramuscular and intravenous injections; the average figures for blood drawn after half an hour and one hour respectively were about the same, and the concentration in specimens of blood drawn after two hours and onwards showed a gradual fall, the intramuscular figures being somewhat higher at this stage than the intravenous ones; the concentration reached within the first two to three hours after administration by the oral route was in some cases distinctly lower.

The next point in our investigation was to determine whether any relationship existed between the concentration of quinine in the circulating blood and the parasite count at any particular moment. In clinical practice the relationship between concentration of quinine and parasites in the blood appears to be very variable. This may be due to virulence of malarial parasites, variations in the susceptibility of individuals, or to variations in the concentration of quinine in the blood of patients receiving the same therapeutic dose. James (1931) observed that in induced malaria there is always a tendency on the part of every individual to clear his system of malarial parasites when given slight assistance, *e.g.*, with quinine. He stated that even large doses of quinine (30 grains) given during the incubation period have no effect; a dose of 15 grains given on the first day of the attack has little effect; one of 5 grains given in the middle of the course stops the fever at once and greatly reduces the number of parasites, but the same dose when given at or near the end of the course and repeated once a day for a few days cures 50 per cent of the cases. Bass (1930) stated that the quantity of quinine necessary for treatment of malaria varies very much in different individuals. As little as 5 grains daily may be sufficient in some cases, while in others 10 or 12 grains may be required; 30 grains daily always suffice to control symptoms as quickly and surely as larger doses.

In view of these observations a series of experiments were performed on monkeys to determine whether with the maximum concentration of quinine obtained in the blood the parasites exhibited any tendency to increase or decrease in number, or to show degenerative changes. *Silenus rhesus* monkeys were infected with strains of *Plasmodium knowlesi* from another infected monkey, as in our previous experiments, and the erythrocyte and the corresponding parasite counts were determined.

Quinine was then administered by the intramuscular or the intravenous route, and the concentration of the alkaloid in the blood and parasite counts were simultaneously determined at stated intervals. Although quinine was administered daily for 2, 3 or 4 days, on account of the difficulty of getting sufficient quantities of the blood, simultaneous counts and estimations of quinine could not be done every day. The results of these experiments are given in the table.

DISCUSSION OF RESULTS

Intramuscular series.—A perusal of the table will show that in monkeys I, II and III quinine was given intramuscularly. In monkey I the quinine concentration reached the maximum limit in about half an hour and remained more or less constant during the first 4 hours, but the number of parasites in the peripheral blood actually increased during the first 24 hours; the parasites were reduced in number gradually and after 48 hours the count was 24,200 and the monkey recovered. In monkey II there was no appreciable change in the number of parasites nor any evidence of degeneration in them when quinine concentration was at its highest. After 48 hours the count increased to 222,500 per c.mm. but subsequent treatment, *i.e.*, two more injections of quinine, controlled the infection and the animal recovered. In monkey III the parasite count actually increased to above one million per c.mm. within 4 hours of administration of quinine and proved fatal on the third day in spite of the fairly high concentration of quinine maintained in the blood. It is also to be noted that in monkeys II and III the concentration of quinine attained in the blood was small in comparison to that in monkey I; this demonstrates a fact that has already been noted by Chopra and others (1934) who found that there was a good deal of individual variation regarding the concentration of quinine attained at different intervals of time after administration of similar amounts. While in one monkey the maximum concentration may be attained in less than half an hour and maintained for some time, in others an equally high concentration never develops.

Intravenous series.—In monkeys IV, V and VI quinine was given intravenously. In monkey V there was no change in the number of parasites on the first day; the count came down after 24 hours, but the animal died on the fifth day showing scanty parasites in smears of blood. In monkey IV the parasite count was more than doubled within 4 hours of quinine injection and in monkey VI 24 hours after the injection the count increased from 497,250 to 1,317,500. In these two cases, in spite of a high concentration of quinine in the blood, the parasites actually increased in number till the count in both cases reached a

TABLE

Showing parasite count per c.mm. and quinine concentration in the blood expressed in mgm. per 100 c.cm. at stated times in plasmodium-infected monkeys that had received $1\frac{1}{2}$ grains of quinine daily

Serial no.	Before injection	AFTER INJECTION					Route and number of doses	REMARKS
		1 hour	2 hours	4 hours	24 hours	48 hours		
I								
Parasite count	346,200	501,300	642,000	604,150	94,400	24,200	Intra-muscular, 4 days	At the end of 48 and 72 hours, just before the second and third injection, the quinine concentration was 0.4 and 0.2 respectively. Recovered.
Quinine concentrations	..	1.05	0.90	1.00	0.45	..		
II								
Parasite count	60,840	56,000	53,000	50,000	55,000	222,500	Intra-muscular, 4 days	Infection was controlled and monkey recovered.
Quinine concentrations	..	0.90	0.50	0.30	0.10	..		
III								
Parasite count	349,050	537,000	805,500	1,020,300	700,400	490,000	Intra-muscular, 2 days	Died.
Quinine concentrations	..	0.75	0.70	0.35	0.20	..		
IV								
Parasite count	513,600	617,500	701,800	1,524,250	345,200	634,400	Intravenous, 2 days	Died on third day. Quinine concentration 1.2 half an hour after second injection.
Quinine concentrations	..	1.00	1.30	0.90	0.25	..		
V								
Parasite count	187,200	163,800	163,000	140,000	80,000	..	Intravenous, 4 days	Died on fifth day; smear from heart blood showed scanty parasites.
Quinine concentrations	..	1.60	1.20	0.90	0.20	..		
VI								
Parasite count	497,250	585,000	500,000	731,250	1,317,500	605,000	Intravenous, 3 days	Died on third day. Quinine concentration 1.2 half an hour after second injection.
Quinine concentrations	..	1.00	0.70	0.65	0.20	..		

figure of over one million per c.mm., a condition which is invariably fatal.

It will be seen from the above that both in the case of intramuscular and intravenous injections no relationship was found to exist between the maximum concentration of quinine in the blood and the number of parasites therein. The infection, as a rule, was not controlled before two or even three injections were given at daily intervals, no matter what was the concentration of quinine in the blood. If any change in parasites was observed, it was an increase in their number immediately after the injection, but never a marked decrease. This is in conformity with the previous findings of Chopra, Das Gupta and Sen (1932) who, describing a fatal case of severe malignant tertian malaria, reported that when malarial infection is heavy, no antimalarial remedy, by whatever route it may be given, appears to be of any avail. The first effect of administration

of quinine is often a definite increase in the number of parasites in the blood.

Mode of action of quinine.—This brings us to the important question of the mode of action of quinine on malarial parasites. If quinine has a direct toxic effect on the malarial parasites, then our aim in treatment would be to obtain as high a concentration of quinine in the blood as possible and to maintain it for a sufficient length of time; but evidence at our disposal does not warrant the view that a high concentration of quinine will have an immediate and direct lethal action on the malarial parasites. Kirschbaum (1923) succeeded in producing malaria by injection of blood containing parasites, which had been set aside for 24 hours after mixing with quinine in concentration of 1 in 10,000, a concentration far greater than it is possible to attain in the circulation. Again Ramsden, Lipkin and Whitley (1918) reported that in certain cases they found the quinine

content to be the highest and symptoms of cinchonism greatest in those in whom the parasites persisted the longest. Acton (1921) expressed the opinion that a quinine concentration between the limits of 1 in 150,000 and 1 in 250,000 is lethal to the malarial parasites only when maintained for a sufficient length of time, and that lesser concentrations have no effect.

These experiments show that quinine, even in high concentration, has no direct lethal action on *P. knowlesi* in monkeys. Moreover a high concentration of quinine cannot be maintained for a considerable length of time in clinical practice because of the rapid excretion of the drug. The drug has been found to cure malarial infection in monkeys, even though the concentration of quinine in the blood may not be high, provided this infection has not progressed beyond a certain limit. Some evidence has been brought forward here to show that concentration of quinine in the blood is not the only factor in bringing about a cure, as no direct relationship has been found to exist between the quinine concentration in the blood and the parasite count in these experiments. Even when the concentration of quinine in the blood was the maximum attainable after administering the largest possible therapeutic dose, the parasites did not show any tendency to reduction in number nor was there any evidence of degenerative changes in them. On the other hand, there was a definite increase in number in most of the cases (I, III, IV and VI).

It has already been stated that the parasitidal action of quinine is manifested when the concentration in the blood varies between 1 in 150,000 to 1 in 250,000. Such a concentration and even higher ones were maintained for several hours in all our experiments, but the parasite counts did not show that it had any immediate effect on the parasites. The question naturally arises what other factors are concerned in the action of quinine besides the concentration of the alkaloid. Chopra and Choudhury (1929) showed that in the circulating blood quinine causes a lowering of the surface tension resulting in greater concentration of quinine at the various interfaces of the cell walls. The enhanced activity depends on this lowering of surface tension and also in part on the increase of the negative charge of the cells. As a result an alteration in the electrical condition of the parasites occurs which leads to their ultimate destruction. An interesting point in connection with the mode of action of quinine has been put forward by Krishnan (1933) who states that the usefulness of quinine is chiefly dependent upon the degree to which the natural process of immunity is stimulated, e.g., by accelerating the mobilization, proliferation and functional activation of the phagocytic large mononuclear cells of the

reticulo-endothelial system, and not upon the quantity of the drug or its direct lethal action on the malarial parasites. How far other mechanisms of protection, such as the inhibition of the reproductive activity of the parasites and the formation of specific antibodies in the host, are responsible for cure of malarial infection is beyond the scope of the present investigation, but the available evidence at our disposal seems to indicate that, even with the highest possible concentration of quinine in the blood, the activity of the parasites is not very greatly retarded. The action of quinine is probably synergistic to other defensive mechanisms set up in the body. The administration of quinine in therapeutic doses would appear to augment these processes, or possibly it acts on the parasites in such a way as to render them more vulnerable or unable to propagate.

SUMMARY AND CONCLUSIONS

1. The concentrations of quinine attained in the blood at various intervals of time after administration of the alkaloid and the simultaneous parasite counts are given in a small series of monkeys infected with *Plasmodium knowlesi*.

2. It has been shown that there is no direct relationship between the concentration of quinine in the blood and the parasite count at any particular time. The highest concentration of the alkaloid attainable without producing too severe toxic effects produces no apparent reduction in the number of parasites, nor degenerative changes in them. On the other hand in the majority of cases there was a definite apparent increase in the number of parasites per c.mm. of blood after administration of quinine.

3. The action of quinine on the parasites does not appear to be direct, but is probably synergistic to other mechanisms set up in the body.

4. It has been observed that once the number of parasites approximates to one million per c.mm. no amount of quinine, however administered, is of any avail.

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THE VENEREAL ORIGIN OF GRANULOMA INGUINALE*

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A CAREFUL analysis of the history of cases of granuloma inguinale very often reveals the incidence of a primary lesion on the genitalia in the form of a small pustule. This finally bursts and leaves a small non-indurated ulcer which often heals but breaks down again. One of us (Bhaskara Menon, 1933) has drawn attention to this feature in the history of cases studied in the General Hospital and the Government Rayapuram Hospital, Madras. In a series of patients, the primary lesion was followed by cicatrization and deformity of the prepuce and the patients came into hospital for circumcision. The subsequent history of these cases showed that the circumcision wound did not heal, but continued to break down till all the clinical features of granuloma were reproduced. In other instances, the sore had healed, but had broken down again and the granuloma had developed. The site of the lesion itself is, in most cases, the genitalia, and ulceration of the groin is secondary to spread of infection from the genitalia. It has been argued by Nair and Pandalai (1934) that lack of a primary involvement of the cervix and the vagina is against a venereal origin. But the fact that the organism attacks moist stratified surface epithelium of muco-cutaneous junctions and lives inside epithelial cells is enough to explain this feature. The soft epithelial cells of mucous membranes probably do not afford a footing for the organism.

In sections stained by the Weigert-Gram method, the crowding of the organisms inside the surface epithelial cells can be demonstrated. The implication of the mononuclear cells and intracytic multiplication is a later stage in the spread of the inflammatory process.

The following three illustrative cases reveal very strong evidence of a venereal origin, besides indicating different stages of the disease:

Case 1.—Mr. A. M. K., a young Hindu of twenty-six years, was admitted to the venereal department of the Government Rayapuram Hospital, Madras, on the 3rd August, 1933, for an ulcer on the penis. The history was that the patient had a sore on the same situation six months previously. It had healed after a month's treatment, but had broken down again previous to admission. There was a definite history of exposure to infection one month prior to the development of the first ulcer. It had started as a small painless boil which had burst and had become

an ulcer. On admission, the patient had two small ulcers, each of the size of a four-anna piece, on the under surface of the prepuce near the frenum (figure 1). The ulcers themselves looked soft and vascular and they bled readily on manipulation. The base was



Figure 1
Case 1.—Showing the primary lesion on the frenum and prepuce. Stage I of granuloma inguinale.

soft and there was no induration. There was little pain and there was not the angry-looking inflamed appearance of soft sore. The glands were just palpable. The dark-ground examination was negative and the Wassermann reaction was also negative. An examination of the smears showed typical intracellular forms of the Donovan body. On treatment with urea stibamine the ulcer completely healed.

Case 2.—Mr. V. S., a young Hindu of thirty years, was admitted to the venereal clinic of the Government Rayapuram Hospital, Madras, on the 15th September, 1934. He was a resident of Nellore and had come down to Madras for treatment. He was married five years ago and his wife Mrs. P. A. was an in-patient in the venereal ward on the 13th October, 1933, and subsequently on the 7th September, 1934, for inguinal granuloma. Her case records show that the Donovan organisms were demonstrated. He himself denied all illicit intercourse. There was a definite history of exposure to infection with his wife two months prior to admission. The present condition developed a month after exposure as a small pustule on the right side of the frenum. This gradually became an ulcer.

On admission the condition was one of paraphimosis, with an oblong granulating ulcer, about 2 inches by 1 inch, extending from the meatus on the ventral aspect of the glans over the paraphimotic prepuce (figure 2). There were a number of small papular elevations all round the ulcer. The ulcer itself was indolent, not very painful, soft to the touch and covered with granulations. There was very little discharge. The groin glands were not enlarged. There were no cutaneous lesions, suggestive of syphilis; there was no discharge from the urethra. The dark-ground examination was negative, the Wassermann reaction was negative, but the Kahn test was positive. A smear from the ulcer showed typical intracellular

* A paper read at the Indian Science Congress at Calcutta in January 1935.

forms of the Donovan organisms. Treatment was carried out by intramuscular injections of a 7 per cent solution of the trivalent antimony compound Fouadin.



Figure 2

Case 2.—Showing the granulomatous ulcer with secondary nodules all round. Stage II of granuloma inguinale.

The ulcer completely healed after one month's treatment.

Case 3.—Mr. L. N., a young Hindu of the Komati caste, coming from Nellore district, was admitted to



Figure 3

Case 3.—The chronic well-developed lesion—granuloma genito-inguinale. Stage III.

the Government Rayapuram Hospital, Madras, in May 1934, for extensive ulcerating granuloma involving the genitalia and groins. This was of five years' duration. A careful study of the history of this case showed that, five years ago, the lesion started as an ulcer on the frenum ten days after sexual exposure. This had gradually spread around the prepuce. Circumcision was done at the Government Hospital at Ongole as the ulcer in the penis was healing and breaking down again. He remained in hospital for a month and was discharged when the wound had healed. There was a small ulcer which had developed at the root of the penis; and this had not healed. This gradually spread on to the groin on both sides and also on to the skin of the scrotum. He had been under Ayurvedic treatment for the last five years. There was no history of gonorrhoea. *Two other people who exposed themselves to infection with the same woman got similar types of ulcers, but these had healed with Ayurvedic treatment and that was why the patient persisted with this treatment for such a long period.* He was admitted into the General Hospital, Madras, where, under a course of injections, the ulcer had gradually healed but had broken down again, after discharge from hospital.

On admission, the patient had an ulcer on both sides of the groin, extending all round the root of the penis and leaving only a small area of healthy skin on the anterior aspect of the organ. The ulcerated areas in the groin had also spread across two inches above the root of the penis, forming another communicating ulcer. The whole ulcer was $6\frac{1}{2}$ inches long and $3\frac{1}{2}$ inches wide and had an irregular serpiginous margin. The base was covered with protuberant granulations which showed a few bleeding points. There was an oblique scar extending across above the ulcer, $3\frac{1}{2}$ inches long and 1 inch wide. The scrotum was extensively involved, except at the posterior part.

The dark-ground examination was negative, the Wassermann reaction was negative and Frei's test also negative. An examination of the smear showed Donovan organisms.

Discussion

In case 1 we have an instance of the primary lesions which healed and broke down again. In most cases, in our studies, this primary lesion appeared as a small pustule about three to four weeks after sexual intercourse. The pustule breaks down and becomes converted into a shallow ulcer in about a week. There is no induration. There is very little pain and the discharge is only slight, unlike a soft sore. The ulcers are sometimes multiple. In most cases, there is a definite history of healing followed by subsequent breaking down of the ulcer. Very often there is ulceration at the root of the penis or of the skin of the scrotum, probably by auto-inoculation. The involvement of the moist sodden skin of the genito-crural folds is, in our experience, always a secondary event. In earlier studies, one of us (Bhaskara Menon, 1933) raised the question whether granuloma venereum could be regarded as a secondary infection to some other lesion, such as a soft sore on the genitalia; but subsequent work has shown that the primary sore itself is, to some extent, distinctive and could be differentiated from soft sore. The ulcer is indolent in type, there is no angry-looking inflamed base, there is very little pain and no marked involvement of the lymphatic

glands. Examination at this stage has shown that Duerey's bacillus cannot be demonstrated, but the typical intracellular forms of the Donovan body can be found in smears from the surface, as in case 1, if a careful search is made for the organism.

In case 2 we have an instance of a more advanced type of lesion, following the primary sore. This may be regarded as the second stage of the disease with persistence and chronicity of the penile lesion. The picture here is that of a well-developed granuloma with commencing secondary nodules, all round a chronic granulomatous ulcer confined to the glans and prepuce. The definite venereal history in this case is one that cannot easily be refuted.

In case 3 we have a picture of the well-defined and typical lesion in what might be called the third stage of the disease. Here the granuloma has spread to the groin and there is extensive involvement of the penis and scrotum. The definite venereal history in this case and the history of a similar disease in two other people, though not directly confirmed, reminds one of the case of Mary X, as recorded by Stoddart, when the syphilitic origin of general paralysis was demonstrated.

Summary and conclusions

Our views regarding the venereal origin of granuloma inguinale are re-affirmed. Three illustrative cases are recorded showing the three stages of the disease: a primary lesion, a second stage with the commencement of the granulating lesion with secondary nodules, and a third stage with an established chronic lesion—granuloma genito-inguinale.

In our experience, a careful analysis of the history of cases of granuloma inguinale would reveal a venereal history in a large proportion. In others, there are extra-genital lesions and these can be explained as due to extra-genital inoculations, as in syphilis.

Acknowledgment

We are indebted to Mr. C. R. Krishnasamy, M.S., venereologist of this hospital, for permission to study and report these cases. We are also indebted to Dr. D. R. Annamalai for the careful study of the history of case 3.

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THE EFFECT OF THE USE OF LIVING OR DEAD SUSPENSIONS OF VIBRIOS ON THE AGGLUTINATION TITRE

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In referring to cholera vibrio agglutination reactions in a recent paper (1935), we stated that 'if the antigens are old or have been killed by heat the agglutination titres of many vibrios are sometimes greatly reduced or may even be absent'. In the case of a strain which we used to illustrate this statement it was found that after it had been killed by heating at 60°C. for half an hour it had become inagglutinable with antiserum with which it agglutinated at 1:1,000 when living.

This observation was of interest not only in its bearing on the structure of the vibrios, which was the point of view from which we had approached it, but also in the practical use of the agglutination reaction for the diagnosis of cholera. We have accordingly studied it further.

Antisera against the following strains were used:—

'Rangoon smooth' and 2027, which are typical vibrios isolated from cases of cholera;

W880, a vibrio isolated from water, which does not agglutinate at all or only very slightly with anti-cholera sera;

El Tor, an agglutinating vibrio of human origin not found in a case of cholera;

and 'Rangoon rough' (2) an extremely rough non-motile variant of 'Rangoon smooth'.

These were set up against the strains named in the table which in addition to those already mentioned comprise:—

vibrios 1617 and 505, which are strains isolated from cholera cases;

'Rangoon rough' (1), a rough vibrio isolated from the same case as 'Rangoon smooth';

and 'Rangoon rough' (2a), a smoother vibrio isolated from the extremely rough 'Rangoon rough' (2).

The killing of the vibrios was carried out by heating them for half an hour at 60°C. in the water bath. The suspensions were of a concentration of approximately 2,000 million per c.cm. before dilution with equal amounts of the diluted antisera. Readings were made after 4 hours at 56°C. and again after the tubes had stood overnight in the ice-box. The titres given represent the dilution in the tube showing at least '1-plus' agglutination; 'plus-and-minus' readings were neglected, as also were titres below 1:50.

The results are given in the following table:—

yet in general the higher titres are given when living vibrios are used. The difference is

TABLE

Effect on the agglutination titre of the use of living and killed suspensions of vibrios

Antisera	Vibrios	Titre when killed suspension is used	Titre when living suspension is used
'Rangoon smooth'	'Rangoon smooth'	1,600	12,800
	1617	400	1,600
	'Rangoon rough' (1)	0	200
	2027	0	2,000
	505	0	1,000
	W880	0	0
	'Rangoon rough' (2a)	500	5,000
2027	El Tor	500	800
	'Rangoon smooth'	400	1,600
	1617	200	400
	'Rangoon rough' (1)	0	0
	2027	3,200	6,400
	505	800	3,200
	W880	100	100
W880	El Tor	400	400
	'Rangoon smooth'	0	400
	1617	50	50
	'Rangoon rough' (1)	0	0
	2027	200	200
	505	0	800
	W880	12,800	12,800
El Tor	'Rangoon rough' (2)	50	0
	El Tor	50	200
	'Rangoon smooth'	50	0
	1617	400	500
	'Rangoon rough' (1)	0	0
	2027	0	50
	505	0	0
'Rangoon rough' (2)	W880	0	0
	El Tor	3,200	4,000
	'Rangoon smooth'	0	0
	1617	0	0
	'Rangoon rough' (1)	0	0
	2027	0	0
	505	0	0
	W880	0	200
	'Rangoon rough' (2)	200	25,600
	El Tor	0	0

A consideration of the table shows that 'Rangoon smooth' antiserum agglutinates its own strain at eight times greater dilution when living organisms are used. In the other cases where this antiserum was studied (except that of the El Tor strain), the titre with living organisms is also significantly higher, and in the case of three vibrios, apparently inagglutinable organisms are found to be agglutinable when living vibrios are being tested. This finding is of interest since two of these strains (2027 and 505) are from cases of cholera and the antiserum is also against a cholera vibrio. In spite of this combination, however, if killed suspensions are used these two organisms appear to be inagglutinable.

In the case of 2027 antiserum the differences in the two sets of suspensions are less marked,

especially marked in the cholera vibrios 'Rangoon smooth' and 505.

The antiserum against the water vibrio W880 reaches a titre of 12,800 with its homologous organism whether this is living or dead. Two of the cholera vibrios, 'Rangoon smooth' and 505, are definitely agglutinable when their suspensions are used in the living condition, and as definitely inagglutinable when the emulsion is that of killed vibrios.

With the El Tor antiserum there are practically no differences between the two sets of experiments.

'Rangoon rough' (2) antiserum does not agglutinate any of the heterologous strains when these have been killed. When living emulsions are used it gives a definite reaction

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OBSERVATIONS ON THE VITAMIN-A
VALUE OF HALIBUT-LIVER OIL

By B. AHMAD, Ph.D.

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SINCE the work of Karrer, Morf and Schöpp (1931), at Zürich, and of the British

(Continued from previous page)

chemists in Liverpool and London (Heilbron, Heslop, Morton, Webster, Rea and Drummond, 1932) on the isolation of vitamin A from halibut-liver oil, the latter has been regarded as one of the richest natural sources of vitamin A. Emmet, Bird, Nielsen and Cannon (1932) examined a number of different samples and observed that this oil was 75 to 125 times richer in vitamin A than the standard cod-liver oil and at the same time it was the richest known source of vitamin D. Commercial interests have not failed to exploit these findings and halibut-liver oil has been widely advertised as a better and more potent substitute for cod-liver oil. On account of its high potency in fat-soluble vitamins it has the advantage that it is required to be taken in a much smaller dose than cod-liver oil which very often is not very readily taken by children. Halibut-liver oil is expensive but it is claimed that, value for value as a source of vitamins A and D, it is cheaper than cod-liver oil.

with W880 vibrio, but with none of the others. Its behaviour with its homologous organism is noteworthy: a titre of 1:200 with killed organisms and of 1:25,600 when the same organisms are used in the living condition.

In general, it may be said that the use of living vibrio suspensions has the advantage of giving agglutination to higher titres, and even at times of allowing agglutination to occur where otherwise it would not. On the other hand, when an antiserum like W880 is being used, there may be some loss of specificity with living suspensions, in that vibrios from cases of cholera, like 'Rangoon smooth' and 505, may agglutinate with it. However, this situation is not likely to occur in routine agglutination tests, where antisera to known cholera vibrios are being used, and in experimental work both kinds of suspensions may be used. Living suspensions seem to possess a distinct advantage over dead suspensions in the vibrio agglutination test.

Recently, halibut-liver oil has found its application in general clinical practice in India. During the last few months it was brought to our notice by some local medical practitioners that in their experience infants and children, whose lack of normal growth they believed to be due to a dietary deficiency, did not respond so well to halibut-liver oil as they did to cod-liver oil. Indeed in one case, where prolonged administration of halibut-liver oil had failed to produce any beneficial effect on the general health of the child, the administration of cod-liver oil resulted in an immediate response—an increase of weight.

At our suggestion two samples of halibut-liver oil which had failed to show any results in clinical tests were brought to this laboratory for examination as to their vitamin potency. Colorimetric tests for vitamin A were made and it was found that though the values were somewhat less than those claimed by the importers, they were 35 to 40 times more potent than an average sample of imported cod-liver oil (giving 6.0 'blue units' in 10 per cent solution). Similar complaints had been brought to the notice of Dr. B. C. Guha (private communication) but when he proceeded to test a number of samples of halibut-liver oil by the colorimetric test, the values were not found to be very seriously lower than was expected. Our own observations and those of Dr. Guha, therefore, gave rise to the suspicion that probably the colorimetric test was giving higher values than the actual vitamin-A content of the oil, and possibly a chromogen other than vitamin A was present in halibut-liver oil.

The observation that moderate heating lowers agglutinability is an old one. The current explanation of this variability is that the heat-labile flagellar 'H' antigen is injured or partially destroyed by the heat. It is in fact highly probable that some change in the vibrio surface is brought about by the application of a temperature of even 60°C., but whether this change is in the flagellar portion of the vibrio alone or whether the whole organism is modified slightly by heating is as yet an unanswered question. It is clear that the strains we have studied do not all act in the same way when heated to the same temperature, since some of them lose their agglutinability entirely while others have the same titre as in the living condition.

Whatever may be the actual basis for the differences in agglutination between living and dead organisms, it is our purpose here only to call attention to the practical importance of the use of living cultures in the cholera agglutination reaction, as otherwise cholera strains may be labelled as inagglutinable when as a matter of fact they are agglutinable. Our work has shown that such confusion can arise with strains from cases of cholera.

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In view of these observations we have tested a representative sample of halibut-liver oil both colorimetrically and biologically. This sample was very kindly supplied to us by Dr. B. C.

Gnha. The results of these tests are described below :—

Colorimetric tests

This test was carried out according to the technique of Carr and Price (1926). 1.0 grammes oil was dissolved in chloroform and the volume made up to 250 c.cm. 0.2 c.cm. of this solution was mixed with 2 c.cm. of antimony trichloride reagent and the colour estimated after 30 seconds in a Lovibond tintometer. This gave a value of 9.5 blue units. In 10 per cent dilution the value would be $9.5 \times 25 = 237.5$ blue units.

Biological tests

The usual technique was employed using young albino rats as the test animal (Ahmad and Drummond, 1930). After 3 to 4 weeks on the vitamin-A-free basal diet their weights began to decline and they showed typical growth curves indicating depletion of their vitamin-A reserves. Then supplements of halibut-liver oil were fed for $3\frac{1}{2}$ to 4 weeks. The results of these tests are summarized in the following table :—

Rat no.	Sex	Dose of halibut-liver oil (mg.)	Total time of test (days)	Total change in weight (g.)	Average growth per week (g.)
1	♂	0.32	28	66	+16.5
3	♂	0.32	28	60	+15.0
5	♂	0.16	28	67	+16.7
6	♂	0.16	28	65	+16.2
10	♂	0.08	28	40	+10.0
11	♀	0.08	24	25	+ 7.1
12	♀	0.08	28	28	+ 7.0

All the rats showed good growth after receiving the doses of halibut-liver oil. Most of the animals showed xerophthalmia at the time of vitamin-A depletion; this was completely cured in all animals after the administration of this oil. It is thus clear that a daily dose of 0.08 mg. of this sample of halibut-liver oil was quite sufficient for the normal vitamin-A requirements of the rat.

Conclusions

The biological results are in good agreement with the colorimetric tests. An average sample of good cod-liver oil which shows 10 blue units in 10 per cent dilution induces normal growth by a dose of 2 to 4 mg. per day. This halibut-liver oil showed 237 blue units in 10 per cent dilution and was about 24 times richer in vitamin A than an average cod-liver oil. Its rat dose should be $\frac{1}{24}$ th of 2 mg., i.e., 0.08 mg. This oil is found to be quite active in that dose. There is therefore no disagreement in the results of colorimetric and biological tests.

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VALUES OF CONSTANTS IN THE ANALYSIS OF *GHI* FOR DETECTION OF ADULTERATION

By B. B. BRAHMACHARI, D.P.H.

Director of Public Health Laboratory, Bengal

EIGHT hundred samples of *ghi*, labelled as buffalo *ghi*, were received and analysed by us under the Bengal Food Adulteration Act from January 1933 to June 1934. Under the Act, buffalo *ghi* is to be pronounced as not genuine if the Reichert-Wollny value falls below 30, the saponification value falls below 222 and the refraction reading at 40°C., Ziess' scale, is outside the range 40–42.5.

In 355 of these samples, the Reichert-Wollny value was 30 and over, and so they were declared as genuine. In the other 445 samples, it was below 30; so, according to the Act, they had to be pronounced as adulterated.

One hundred of these samples had the Reichert-Wollny value at 18 or less, and were, therefore, frankly adulterated. As to the remaining 345, we know that for every 3.3 per cent of adulteration the value of this constant of a *ghi* with the value of 30 falls by 1. But, as I have shown in my paper on 'Constants of buffalo *ghi*' (1932), the analysis of 50 samples

(Continued from previous column)

The samples of halibut-liver oil which we have had occasion to examine were all about 25 times richer than standard cod-liver oil (giving 10.0 blue units in 10 per cent solution). In some instances the vendors claimed that they were 50 to 100 times richer than cod-liver oil. Therefore it is not surprising that a dose one-fiftieth or one-hundredth of a cod-liver oil dose produced no results.

At the same time it may be pointed out that a child that is weak and refuses to grow would not, in 90 per cent of cases, be suffering from a mere deficiency of vitamin A or vitamin D, and the vitamin potency of fish-liver oils cannot be judged on the basis of these clinical observations alone.

I wish to express my thanks to Professor H. E. C. Wilson for his kind interest in this work and to the Director, All-India Institute of Hygiene and Public Health, for permission to publish this note.

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of *ghi* prepared by ourselves from genuine buffalo milk showed these constants to have values ranging as below:—

Reichert-Wollny value	.. 20.9–38.5
Saponification value	.. 213.6–237.5
Refraction reading at 40°C.,	
Ziess' scale ..	.. 39.0–44.5

Can we, in face of this finding of our own, condemn, without further proof, all these 345 samples as adulterated, simply because the Reichert-Wollny value was below 30 and the other constants departed from their standard values correspondingly? The fifty samples of our genuine buffalo *ghi* were each from a single animal, but the market *ghis* are blends of products from several animals; so it was believed that the variation in the values observed by us in the products of individual animals would give place in the blended commodity of the market to the uniformity of the official standards. But the Reichert-Wollny value of the 355 samples declared under the Act as genuine were not concentrated at or even about 30, but ranged from 30 to 41. Can we presume that, in the genuine buffalo *ghi* of the market, the Reichert-Wollny value cannot go below 30 though it can go above that value up to 41?

As yet no adulterant or method of sophistication has been introduced into this country which would keep up the Reichert-Wollny value of the adulterated *ghi* at 30 and over; so the

deviation of the values from 30 and so form a mathematical series which can be represented by the graph of the equation:—

$$y=f(x)$$

x being deviation from the magnitude 30 and y , the frequency, i.e., number of samples of the deviation x . Before working out the values of $f(x)$, we should remember that the variates in question, i.e., the Reichert-Wollny values, are not integral but graduated, each value of the series stands for a class of values, for example, the magnitude 30 is a class with 30 as its class value and includes all values between 29 and 31. It is quite likely that some of the values at either limit of the class might be counted with those of neighbouring classes. To eliminate this error, we take for the frequency of these magnitudes the moving averages of frequencies of three magnitudes, viz, the average of each magnitude in question and of the one on either side of it. The differences between the corrected and the observed magnitudes are, however, of not much significance. The standard deviation of the series is found to be 3.5 and, so, the modulus, 4.9. We find that the frequencies are reproduced practically exactly by the equation

$$y=y_0e^{-\left(\frac{x}{4.9}\right)^2}$$

as will be evident from column 5 of table I below:—

TABLE I

Frequency of 355 samples of genuine buffalo ghi of the market with Reichert-Wollny values at 30 and higher for each of the values

Magnitude (Reichert-Wollny value)	Frequency observed (number of samples)	Frequency as corrected by method of moving averages	Frequency according to the equation $-\left(\frac{x}{4.9}\right)^2$ $y=y_0e$	Difference between columns 3 and 4
1	2	3	4	5
30	80	73	73	nil
31	67	69	69	nil
32	62	59	59	nil
33	47	47	49	2
34	31	36	37	1
35	29	25	25	nil
36	14	18	18	nil
37	11	11	11	nil
38	8	7	7	nil
39	3	4	4	nil
40	2	2	2	nil
41	1	1	1	nil

355 samples of higher values which were declared as genuine under the Act were in all probability not adulterated. An inspection of the figures for the number of samples of these different Reichert-Wollny values strongly suggests that they are a function of the

The corrected observed frequencies of all the values were the same as those derived from the equation except those of 33 and 34; the corrected observed frequencies of these values were 47 and 36, respectively, but the calculated frequencies were 49 and 37; the differences, however,

are too small to be of significance. Therefore

$$y = 73e^{-\left(\frac{x}{4.9}\right)^2}$$

is the equation for number of samples, y , out of the 355 genuine buffalo *ghis* of the market for every deviation x from the mode 30. But the equation is of a normal curve, as will be evident from it, the frequency cannot vanish on the negative side; on the contrary if we analyse n genuine buffalo *ghis* from the market and find N of them to have the Reichert-Wollny value of 30, then, provided, of-course, that those genuine *ghis* which had lower values have not been sorted out and excluded from the market, and provided also that the number n is sufficiently large, there must be $\frac{n-N}{2}$ samples with values ranging from

31 to 41 and also $\frac{n-N}{2}$ samples with values ranging from 29 to 19 and, for the same deviation from the value 30 on either side of it, there will be the same number of samples. The value of the ordinate of the graph representing the frequency of the magnitude for each deviation on either side will be :—

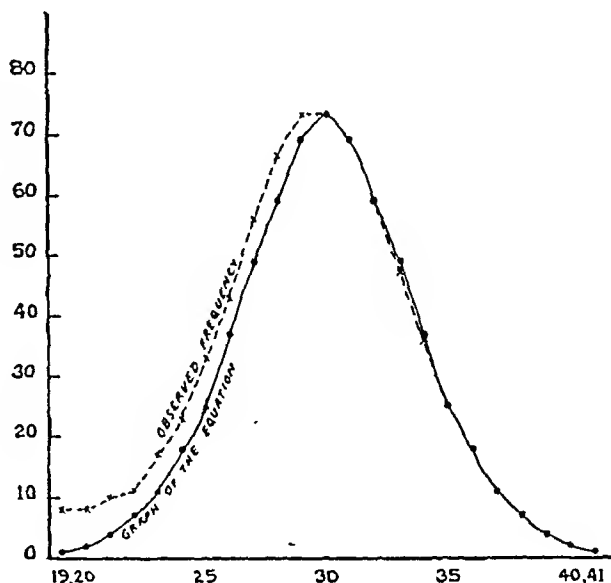
For deviation	0	1
	1	0.961
	2	0.850
	3	0.702
	4	0.534
	5	0.325
	6	0.243
	7	0.146
	8	0.081
	9	0.041
	10	0.019

The following chart compares the curve of corrected observed frequencies of the 700 samples of buffalo *ghi* from the market found on analysis to have Reichert-Wollny values from 41 to 19, with those for the same number of genuine buffalo *ghis* from the market according to the equation

$$y = 73e^{-\left(\frac{x}{4.9}\right)^2}$$

From it we see that while the curve of the observed frequencies of the values 30 to 41 is the same as the graph of the equation, the curve of the lower values is also continuous with it and has the same shape but keeps to a higher level for all the values, the departure increasing rapidly as the value decreases. Now while the samples of the higher Reichert-Wollny values are, under the existing circumstances, necessarily genuine, those of the lower values may be genuine or may be adulterated, their values having been reduced to the lower level by the adulteration. We should also remember that, thanks to the public analysts condemning all samples with the lower values

as adulterated, some of the big merchants are keeping chemists and refusing to accept any *ghi* of a lower value; when such rejection of buffalo *ghis* of the lower values by the merchants will be universal, the samples of all such



values received by the public analysts will of course be all of adulterated *ghis*, but then their curve will also cease to conform to that of the higher values. As it is, the frankly adulterated one hundred samples with Reichert-Wollny values lower than 19 do not fall into any mathematical series, their frequencies are as follows :—

Reichert-Wollny value	Frequencies (i.e., number of samples)
18	7
17	5
16	3
15	7
14	10
13	8
12	9
11	7
10	8
9	1
8	1
7	3
6	10
5	0
4	2
3	2
2	2
1	4
less than 1	11

In the case of the 700 market samples of the values 41 to 19 under discussion, the departure of the curve of the values 29 to 19 from that of the higher values is not so marked; therefore the genuine samples of the market *ghis* of these lower values must have been fairly

represented in it. The following table of frequency of the lower values correspond to table I for the higher values :—

All samples of class II should always be examined for other characters and direct detection of the adulterants, viz, unsaponifiable

TABLE II

Frequency of 345 samples of buffalo ghi of the market with Reichert-Wollny values of 29 to 19 for each of the values

Magnitude (Reichert-Wollny value)	Frequency observed (number of samples)	Frequency as corrected by method of moving average	Frequency according to the equation $y = y_0 e^{-\left(\frac{x}{4.9}\right)^2}$	Difference between columns 3 and 4
1	2	3	4	5
29	71	73	69	4
28	69	66	59	7
27	57	56	49	7
26	41	43	37	6
25	32	33	25	8
24	25	23	18	5
23	12	17	11	6
22	13	11	7	4
21	9	10	4	6
20	9	8	2	6
19	7	8	1	7
Total ..	345	348	282	66

So while 348 samples had values from 29 to 19 including 3 which were counted with the samples of the value 18 in the uncorrected frequency, only 66 of them were certainly adulterated; a glance at column 5 also shows that the probability of a sample being adulterated increases rapidly with the fall of the value. In any case, it follows from the above that *no buffalo ghi should be declared as adulterated simply because of its Reichert-*

matter, vegetable fats and hydrogenated oil and animal fats other than milk fat, before giving an opinion on them one way or the other. The remark applies equally to samples of these values even when labelled 'mixed cow ghi' and 'buffalo ghi or cow ghi'. The classification of the ghi under these three designations is futile for the purpose of the Act; we have no test as yet by which we can tell buffalo ghi from cow ghi and any manufacturer or merchant may

TABLE III

Class	Reichert-Wollny value	Saponification value	Iodine value	Refraction reading at 40°C.	Genuineness
I	41 to 30	238.1 to 225.3	22.1 to 32.3	39.1 to 42.1	Genuine
II	29 to 19	224.1 to 212.4	33.2 to 42.5	42.4 to 45.2	Doubtful
III	18 and less	211.0 and less	43.5 and over	45.5 and over	Adulterated

Wollny value being less than 30, if that value is still between 29 and 19 and the departure of its saponification values, iodine value and refraction reading correspond to the lower Reichert-Wollny value. For Reichert-Wollny value below 19 there is very little chance of a sample being genuine. So regarding genuineness on the basis of the values of their above-named constants, samples of ghi fall into three classes shown in table III.

very well adulterate buffalo ghi to the extent of 20 per cent or over, and yet it will pass as genuine cow ghi, if we satisfy ourselves simply with the Reichert-Wollny value, the saponification value and refraction reading, and even with the iodine value.

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A SIMPLE METHOD OF BUG DESTRUCTION

By J. N. PACHECO, M.R.C.S., L.R.C.P., I.M.D.
Deputy Superintendent, Ranchi European Mental Hospital

ONE of the minor problems of hospital administration in the East is the elimination of bugs from the wards. The reputation of a hospital, especially among the general public, is sometimes gauged by the presence or absence of this pest. There are innumerable ways of destroying the bed-bug, but it is doubtful if the time and money spent on disinfection is commensurate with the results, for no sooner are we satisfied that disinfection has been thorough and complete than the bug makes its reappearance. The cause of this is that none of the modes generally employed—be the disinfecting agent chemical, liquid, gaseous or thermal—brings about total and complete destruction, and, what is more important, acts as a barrier to future invasion.

The following notes are published with a view to showing the success that has been achieved at the Ranchi European Mental Hospital, and with the hope that the method may be of some use to those hospitals that find bug disinfection a problem.

Until recently there was hardly a bed in this hospital that did not at certain seasons harbour bugs, and that in spite of the fact that every bed, mattress and pillow had been disinfected once a month.

The old method of disinfection was as follows :—

Once a month all the iron beds with their mosquito-pole fittings were immersed for ten minutes in a large iron tank containing boiling water and after drying in the sun they were wiped down, reassembled and put back in the wards. All mattresses, pillows and nets were subjected to the effects of steam for half an hour each, in a Thresh's disinfector, working at 5 to 10 lbs. pressure. This method entailed not only a recurring expenditure on coal and fuel for the tanks and the boiler, but a party of coolies had to be employed in moving the beds and mattresses from the dormitories which are mostly on the upper floor. In addition to the disorganization of the ward for the better part of the day, beds, poles, or fittings were often damaged in transit. The end-result was that bugs made their reappearance by the end of the month.

Another mode of attack was tried by heating the beds with an open flame from a blow lamp but this was equally ineffective. Fumigation was not attempted for reasons of expense and the attendant dangers. It was strange that dormitories on the first floor were more heavily infested than those on the ground floor. The engineers thought that bugs were breeding in the cracks and crevices in the walls, doors or

floor, or that they dropped from the roof and the electric wire casings. The latter were opened and examined and all crevices well filled up with cement. No appreciable improvement followed.

In August 1930, our Inspector-General of Civil Hospitals, the late Colonel W. Houston, I.M.S., came to our rescue during an inspection, with the suggestion that we should wipe all beds down with ordinary coconut oil. His experience of numerous methods of disinfection whilst Port Health Officer of Bombay taught him that coconut oil is a poison to the bed-bug and that the application of coconut oil is the only effective and economical way of eradicating bugs completely. Disinfection of all wards was then carried out, according to his instructions, by Dr. S. A. Hasib.

Bug census.—Kraepelin Ward was chosen for taking a census of bugs, as this ward was mostly heavily infected.

Four beds were marked out in this ward and a bug census done on them on 6th August, 1930. The results were as follows :—

Bed No. I	..	..	1,177 bugs
" " II	..	..	1,253 "
" " III	..	..	933 "
" " IV	..	..	879 "

Thresh's disinfector.—The efficiency of the disinfector was tested by putting a dozen bugs in four small cloth bags and then placing them inside the mattresses and disinfecting them. Six mattresses were disinfected at a time. The bags containing the bugs were placed in mattresses at four different levels, the top, bottom and the middle ones. After half an hour's exposure to steam the mattresses were taken out and the bags examined. The bugs in all four bags were found dead.

Procedure

(1) All the mattresses and pillows were disinfected in the Thresh's disinfector for half an hour.

(2) All cots and mosquito poles were immersed in boiling water for ten minutes each.

(3) The cots and poles were then painted with pure coconut oil and put back in the wards.

All other wards were similarly disinfected on the following days.

On 13th August a bug census, of the same four beds that were examined the previous week, was done again and the results were now as follows :—

Bed No. I	..	..	178 bugs
" " II	..	..	54 "
" " III	..	..	126 "
" " IV	..	..	34 "

Disinfection of all cots, mattresses, etc., was again repeated as in the previous week. In addition the corners and the junctions between

the walls and the floor were all painted with coconut oil. All doors, windows, corners and crevices were sprayed with a solution of kerosene oil emulsion prepared as follows:—

Half a pound of soap was mixed with a gallon of cold water and then boiled; the boiling water was then slowly poured into two gallons of kerosene oil and constantly stirred. It formed into an emulsion which was mixed with fifty gallons of water.

On 20th August, the bug census on the same four beds was as follows:—

Bed No. I	..	..	..	10 bugs
" " II	..	..	..	4 "
" " III	..	..	..	5 "
" " IV	..	..	..	8 "

Disinfection was again carried out as in the previous two weeks.

The above procedure has been followed in all wards till all the bugs have been completely destroyed. At present the disinfecting process has been reduced to merely wiping down all cots once a week with a rag dipped in coconut oil. The cost is exceedingly small, the procedure simple and all the bother of removing beds for boiling and mattresses for steaming has been eliminated. The result is that bugs are now entirely absent.

I am grateful to the medical superintendent for permission to publish this paper, as well to Dr. S. A. Hasib, M.B., for his notes on the experiments carried out by him.

A Mirror of Hospital Practice

FIVE CASES OF RHINOSPORIDIOSIS, FOUR IN FEMALES

By F. R. W. K. ALLEN, M.A., M.D. (Dub.)

MAJOR, I.M.S.

Civil Surgeon, Raipur

REPORTS of rhinosporidiosis in females are rare. The five cases recorded here may therefore be of interest. No other cases or any other kind of nasal growth or polypi have been seen at the Main Hospital, Raipur, during the last eighteen months.

Case 1.—A married Hindu female labourer, aged 30, of Dhore village, Bhilai Thana, Drug district, Central Provinces. She came complaining that three months previously a slight swelling occurred in her right nostril and this had gradually grown to its present size. On examination it was seen that a red mass of granulation tissue, which bled freely when touched with a probe, filled the right nostril. The mass was the size of a ground-nut and grew from a pedicle attached to the anterior end of the inferior turbinal. The tumour was removed on the 5th January, 1934, and was sent for examination to the Haffkine Institute, Bombay, which reported that the condition was rhinosporidiosis.

Case 2.—A married Hindu female of the Dhobi caste, aged 25. She had never left her village of Satbhawa in Simga Thana, Raipur district, Central Provinces, until the beginning of September 1934. She complained that eight months previously she noticed a 'pimple' in her right nostril and that since then it had gradually grown to its present size. On examination it was seen that a red mass of granulation tissue, which bled slightly when touched with a probe, filled the right nostril. The mass was the size of a ground-nut and grew from a pedicle attached to the anterior end of the nasal floor. She stated that none of her relatives suffered from similar growths. The tumour was removed on the 27th September, 1934. A portion examined locally under the microscope showed typical round cystic bodies full of spores. A portion of the growth was sent to the pathologist, Robertson Medical School, Nagpur, who confirmed the diagnosis of rhinosporidiosis.

Case 3.—A Hindu female child, 8 years old, daughter of a weaver of Maldi village, Raipur district. She

was brought to the Main Hospital, Raipur, for a growth which protruded out of her left nostril.

Her mother stated that some time back the child commenced to suffer from occasional attacks of bleeding from the nose. About six months ago the growth was noticed. It gradually enlarged until it became the size of a large bead. It was ulcerated and foul smelling.

On the 12th November, 1934, the growth was removed by means of a snare, during my absence. It was growing from the septum. On my return I was shown the tumour which was about the size of a ground-nut. It was a typical red cauliflower-like growth springing from a fairly broad pedicle. Local examination under the microscope showed *Rhinosporidium* and a portion of the tumour, sent to the pathologist, Nagpur, for preparation of sections, was reported upon as a rhinosporidial growth.

Case 4.—A Hindu female agriculturist, about 50 years of age, of Phapuadi, Raipur, came to the Main Hospital, Raipur, on the 27th December, 1934, for a large red cauliflower-like mass which protruded from her right nostril. Six months ago she noticed that the inside of her right nostril was very itchy and since then the tumour grew until it completely blocked the nostril. None of her friends or relations suffer from a similar complaint. The nasal secretion was examined and typical rhinosporidium seen. At the time I was unable to examine the case more fully and she was told to return next day for operation but failed to put in an appearance.

Case 5.—A male Brahmin malguzar and cultivator, 22 years of age, of Rajim in Raipur district, came on the 23rd December, 1934, complaining of a large red cauliflower-like growth protruding from his right nostril. The nasal discharge was examined and typical rhinosporidium seen. He stated that eight years previously he suffered greatly from itching in his right nostril. Shortly afterwards the nostril became blocked and caused difficulty in breathing. Then he noticed the tumour which grew slowly and at times bled freely. In 1930 it was removed at the Main Hospital, Raipur, but recurred after a year. It was arranged that he should come for removal of the growth next day, but he arrived so late that the operation was postponed and he failed to put in an appearance again.

Such cases are usually diagnosed as nasal polypi but they are obviously not ordinary polypi. I am under the impression that rhinosporidial infections are not uncommon in

the rice-growing tracts of the Raipur and Drug districts. It is possible that the spores are inhaled when rice is being husked and find a suitable habitat in some abrasion of the nasal mucous membrane from whence the tumour grows. Unless the whole tumour and pedicle is most carefully removed it is almost certain to recur for spores can be found in the pedicles.

A CASE OF RETAINED GANGRENOUS PLACENTA

By JAGADISH CHANDRA DUTTA, L.M.F.

Rajah Alli Tea Estate, Hoogrijan P. O., Assam

I was called in recently to see a case of retained placenta in a Hindu multipara, aged about 22 years. She had been delivered of a male child three days ago but the placenta had not been expelled. The patient and her relatives thought that it would come out spontaneously. When they saw that it was not expelled they called a *dai*, who along with others roughly handled her without any antiseptic precaution and tried their utmost to extract the placenta but without success. When I was called in there was a bad odour coming from the vagina. On examining the case I found that the placenta was in a gangrenous state and I therefore removed it by hand, piece by piece. The vaginal mucous membrane was very red, inflamed and tender to touch. I thoroughly douched out the vagina and the uterus with Monsol lotion after removing the placenta. On the next day I went to see the case prepared to douche out the vagina and uterus again but the patient did not allow me, saying that she was feeling quite fit and well. There was no temperature. I gave the patient ergot mixture with brandy. She made an uneventful recovery.

The peculiarity of the case was that there were no signs of sepsis, although the placenta was in a gangrenous condition and the uterus had been roughly handled by the *dai* and others without any antiseptic precautions.

I am indebted to my medical officer, Lieutenant-Colonel F. J. Palmer, for his kind permission to publish this note.

A CASE OF NASAL MYIASIS

By A. K. GHOSE, L.M.F., L.T.M.

Ambari Tea Estate, Carron P. O. (Jalpaiguri)

On the 5th August, 1934, a coolie, aged about 55 years, came to the dispensary complaining of a very uneasy sensation in his nasal cavity.

On naked-eye inspection nothing could be found out, so he was sent away without obtaining any relief. Next day he again came and complained that he felt as if something had entered his nostrils. On further enquiry he told me that about a week ago, while he was working in the garden, a fly entered his nasal cavity and after a short time it came out in the living condition. He did not report this matter to me previously, as he had no idea that his present trouble had any relation with the entrance of the fly. Again I examined his nose but failed to detect anything. Thinking however that it might be a case of nasal myiasis, I douched out both nasal cavities with a weak lotion of spiritus chloroformi, as suggested by Dr. Strickland. Forty-five living maggots (the species of the larvæ could not be identified) came out of his nasal cavity. The patient felt immediate relief from his complaint.

It is very interesting to note how a fly could lay its eggs in that unfavourable site within such a short time.

A CASE OF GYNÆCOMASTIA

By A. C. DEY, L.M.F. (Cal.)

Senior Resident Medical Officer and Pathologist, Astanga Aurved Medical College Hospital, Calcutta

M. C., Hindu male, aged 24 years, a clerk by occupation, was admitted in the Astanga Aurved Hospital for operation for gynæcomastia (right side) on 19th September, 1934.

Previous history.—The patient said that the malady commenced about three years ago. Both the sides were originally of equal size and shape until the right side began gradually increasing in size. There was no discomfort although the patient felt uneasy in his mind owing to his appearance (*see figure*).

Reproductive system.—The testes were of equal size and could be felt in the scrotum. The penis was of normal size. The voice and the growth of hair in the



pubis and face was like that of a young healthy male adult. The general appearance of the patient was healthy.

The tumour.—Circumference—16 inches; lateral border—1 inch anterior to the mid-axillary line; upper border—at the third right intercostal space; lower border—at the seventh right intercostal space. The feel of the organ was soft and nodular. The nipple was of equal size with that of the healthy side. No lactation was present.

The operation was performed on 23rd September by Dr. S. C. Das, M.B., under chloroform anaesthesia. The weight of the gland substance was 13 ounces.

Special points to note in this case are (1) unilateral, (2) the development was more than an ordinary gynæcomastia, (3) the presence of well-marked lobules, (4) a well-formed scrotum and penis, (5) the testes on both sides equal with normal epididymis.

The case was admitted under Dr. Ghosh, and I am grateful to him for permission to publish the notes of this case.

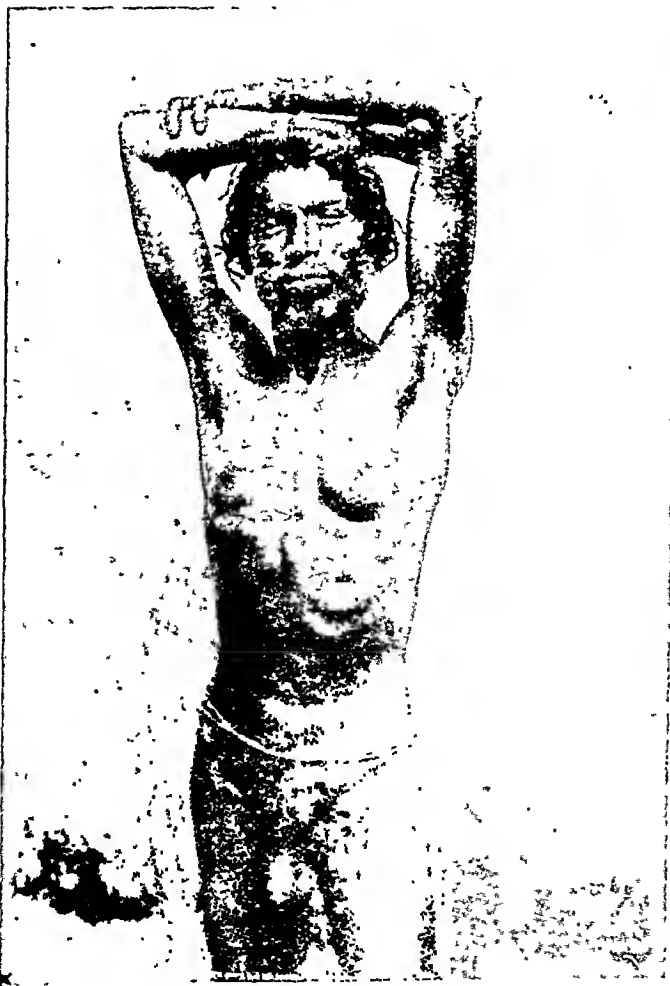
A CASE OF GYNÆCOMASTIA

By S. RAMDAS, L.M.S., L.C.P.S., L.R.C.P., M.R.C.S.

Assistant Surgeon, L. F. Hospital, Bobbili, Vizagapatam District

S. N., a male, aged 25 years, was admitted here on the 7th September, 1934, on account of an enlarged left breast.

On examination the breast was as big as that of a healthy multiparous woman with a distinct areola and a fairly big nipple. The gland felt quite uniform to



palpation. There was no inflammation of the gland nor any other pathological condition in and around the breast nor on the skin covering the organ. There was no congenital malformation in any part of the body. As is seen in the text-figure it is evident that the sexual organs are not diminutive but on the other hand appear well developed.

The man is married and, I learn, his wife is pregnant. No peculiar circumstances were found to excite the

growth of this breast. The right breast is quite normal, the nipple is small and pointed and the areola is surrounded by sparse hairs. All the secondary characteristics of a male are evident in the patient. His voice is masculine and there is nothing in his behaviour to suggest that he is of a feminine disposition.

I removed the gland under chloroform by an incision on the line of the lower border of the pectoralis major taking care to preserve the nipple and areola on the same level as the right. The wound healed by first intention and the scar is scarcely visible.

A CASE OF A FIBROMYOMA OF THE VAGINAL WALL?

By S. R. GORE, L.M. & S.

Co-operative Hospital, Hubli

NEELAVA IRBASAPPA, aged 40, was admitted into the Co-operative Hospital, Hubli, on 18th August, 1934, for retention of urine. The retention was of four days' duration, and effort to relieve the bladder was made by a medical man about twelve miles from Hubli, who being unable to draw urine advised the patient to seek treatment at the Co-operative Hospital. In a note he sent with the patient he writes 'I tried to pass catheter but on passing only bloody serous discharge came out'.

On examination it was found that the anterior vaginal wall was protruding outside the vulva, it was very tense, fluctuation could be elicited, and a bloody foul-smelling discharge was oozing slightly from the space between this protruding tumour and the symphysis pubis. The urethra was pressed against the bone and could be found only after a careful search; when this was catheterized a large quantity of urine came out. Evidently the urethra was not found by the medical practitioner who referred the case to us, and it is evident he pricked the vaginal wall high up between the protruding mass and the bladder. The foul-smelling discharge that escaped came from this part. The mass that was protruding was taken by the writer of the article to be the fundus uteri in extreme anteversion with the cervix high up in the posterior fornix. It was not possible to locate the position of the cervix as no speculum could be passed and the finger could not feel it. The abdomen when palpated showed that the whole of the pelvis was occupied by a tumour, which when pressed gave a fluctuating sense to the finger on the protruding vaginal wall.

A provisional diagnosis of an impacted cyst pressing the uterus down in an anteverted position was made and laparotomy was undertaken under general anaesthesia. The patient's general condition was poor.

On opening the abdomen the uterus and the bladder were seen pushed up into the abdomen by a tumour occupying the whole of the pelvis. The size of the uterus was normal and it was completely unconnected with the tumour, which was subserous. It was hard and seemed to be so fixed that an attempt to remove it by the abdominal route, in the presence of the foul discharge from the vagina and the low condition of the patient, was considered inadvisable; the abdomen was therefore closed. An incision was made in the protruding vaginal wall to allow the fluid collected between it and the tumour to escape. The finger introduced through this incision could not make any progress in separating the tumour from the surrounding tissues. It was therefore decided to try to remove the tumour by the vaginal route at another operation if the patient responded well after the relief of the tension and by being catheterized regularly.

On the next day it was found that the tumour was protruding more from the vagina and the woman was getting pains at intervals resembling labour pains. She was operated on on the 21st and on the 24th instant in the night the whole of the tumour was expelled, a very small pedicle of connective tissue

being its only attachment. This was ligated with catgut and the tumour removed.

The patient made an uninterrupted recovery.

The dimensions of the tumour are eight by four and a half inches at the broadest upper end which was felt to be filling up the whole of the pelvis from the abdominal aspect. The weight of the tumour is two pounds.

On inspection of the tumour the cause of my being unable to separate it was revealed. I had cut into the tumour itself and was trying to separate it from inside which was obviously impossible. The vaginal wall was practically fused with the tumour where it was protruding but the pressure of the pelvic muscles threw the whole tumour out, once the vaginal wall was incised.

The interesting point in the case is the demonstration of the tremendous power which the muscles of the floor of the pelvis possess and one can imagine the aid they must give the uterine muscle in expelling the foetus in parturition. I am sure that even if I had succeeded in separating the tumour with my finger I would have found it practically impossible to deliver it with the hand as it was very broad at its upper pole.

I call it a myoma of the vaginal wall because it was completely unconnected with the uterus and was so much in connection with the anterior wall of the vagina.

The duration of the tumour cannot be definitely stated as the history given by the patient is quite unreliable. Her attention was drawn to it only after the retention of urine and then she thought she felt something heavy in the abdomen for four months previously.

I am citing this case because the power of the pelvic muscles is exhibited so plainly.

ACUTE EMPYEMA IN CHILDHOOD

By P. N. RAY, B.A., M.B., F.R.C.S. (Eng.)

Honorary Junior Visiting Surgeon, Medical College Hospitals, Calcutta

EMPYEMA is a serious complication of lobar and broncho-pneumonia, especially in children. Nearly 75 per cent of all empyemas occur under the age of ten years. Consequently the importance of early and adequate surgical treatment is evident; but, unfortunately, early diagnosis of empyema is not always easy. If the temperature does not subside after an attack of pneumonia or if the attack is unduly prolonged, empyema must always be considered first as the underlying cause of mischief. The following case presents many unusual features and seems to be worthy of record :—

R., a male child, aged 4 years and 6 months, was admitted into the children's ward of the Medical College Hospitals for continued pyrexia and cough of one week's duration.

On examination.—The patient looked very ill. Temperature, 101.5°F.; pulse rate 120 to 140; tongue, furred; tonsils, enlarged; pharynx, congested. Cervical and submaxillary lymphatic glands were enlarged. Bronchial râles and rhonchi were present on both sides, the base of the left lung was also dull on percussion. The child complained of abdominal pain. Spleen, palpable below the costal margin. Liver, slightly enlarged. Diarrhoea was present from the beginning.

History of past illness.—The patient suffered from measles at the age of two years and from tonsillitis and malaria when he was three years old.

Family history.—A cousin, living in the same house, died of pulmonary tuberculosis.

Examination of blood

	On admission	Two weeks later
Hb.	55 per cent	..
R.B.C.	3,100,000 per c.mm.	..
W.B.C.	16,000 per c.mm.	14,500 per c.mm.
Polynuclears..	82 per cent	88 per cent
Lymphocytes	18 "	12 "
Large mono.	0 "	0 "
Eosinophils	0 "	0 "
Parasites	None seen	None seen.
Widal	Negative	Negative.
Culture	No growth	No growth.

Examination of sputum.—Nothing abnormal was found after repeated examinations.

Examination of urine.—Chemically this was normal but there were some pus cells, phosphates and urates microscopically.

Examination of faeces.—Culture reports.

1	2	3	4
<i>B. coli</i> <i>Enterococci</i> <i>B. faecialis-</i> <i>caligenes.</i>	<i>B. coli</i> <i>Enterococci</i>	<i>B. coli</i> <i>Enterococci</i>	<i>B. coli</i> <i>Enterococci</i> <i>B. aerogenes-</i> <i>lactis.</i>

Progress of the case.—During a period of 25 days, the pyrexia continued as before. The daily range of temperature varied between 99° to 100°F. and 102° to 103°F. The continued dullness of the left lung on percussion was the most noteworthy feature. Breath sounds and vocal fremitus showed hardly any diminution at all. Bronchial breathing could be heard. The spleen was enlarged. The general condition of the patient was gradually becoming very feeble. The results of the laboratory examinations are noted above.

Skiaigraphy of the chest.—A homogeneous opacity was seen on the left side, but the heart was not pushed out (see figure).

Paracentesis thoracis.—After repeated punctures, pus was localized but was withdrawn with difficulty owing to its viscosity. A pure culture of pneumococcus was subsequently obtained from the specimen.

Operative treatment.—Under combined ether and local novocaine anaesthesia one inch of the eighth rib was resected just in front of the mid-axillary line and about six ounces of creamy pus were let out and the cavity was drained in the usual way. The patient made an uneventful recovery and the wound was completely healed before he was discharged from the hospital.

Commentary

In empyema, generally there is a diminution of both the breath sound and the vocal fremitus,



but in case of children it may not be so, whence arises the difficulty of diagnosis. In a typical case, the general features of pneumonia may be present, but locally the cardinal signs consist of impairment of respiratory movements, displacement of thoracic viscera, dullness on percussion and absence of breath sounds. Frequently, however, as in the case described above, the clinical picture is that of empyema, but the physical signs may not be corroborative. On radiological examination of the chest, a homogeneous opacity was seen on the left side, but the heart was not pushed out. The differential diagnosis lay between massive pneumonia and pleural effusion. After repeated needling, pus was localized but withdrawn with difficulty, owing to its thickness. On culture of pus, a pure growth of pneumococcus was obtained. Drainage was established after rib resection and six ounces of pus were let out. The absence of any cardiac displacement was rather surprising. It was a rare instance of localized empyema complicating an unresolved pneumonia. In children, suppuration within the pleural cavity is frequently localized and encysted, particularly in the middle third of the thorax.

The diagnosis of crypto-empyema is admittedly difficult and an exploratory operation may be called for. A skiagram is useful, but cannot always be relied upon. In case of interlobar or basal encysted empyema, radiograms, taken in the direct lateral position, are

extremely useful in localization. A crypto-empyema may underlie the so-called 'unresolved pneumonia'. Before undertaking any exploratory operation it is, however, imperative to exclude the possibility of pulmonary tuberculosis or gangrene of the lung, by careful and repeated examinations of the sputum. It is scarcely necessary to add that repeated needling is not entirely devoid of danger. The area of the lung may not be closed by adhesions and a generalized empyema may be produced. Haemorrhage may also be serious. It is well to remember that negative results after repeated punctures may be due to blockage and insufficient length or calibre of the needle. The needle is readily blocked by thick pus or masses of fibrin. It may also push the thickened pleura in front of it. Repeated punctures are best made under local anaesthesia. With regard to the question, when to drain, two general principles may be accepted: (1) If there is no pneumonia (meta-pneumonic empyema), operation is indicated as soon as the diagnosis is made. Nothing is gained by waiting. (2) If pneumonia is present (syn-pneumonic empyema), especially streptococcal, the rate of mortality is appallingly high. Aspiration, repeated if necessary, is the method of choice till the pneumonia is resolved. The persistence of a sinus after open drainage, a dreaded sequela, is usually either due to non-expansion of the lung or the superposition of secondary infection. Hence the best safeguards consist firstly of early and adequate drainage and secondly of observance of strict asepsis in dressing.

Summary

(1) The difficulties of diagnosis of empyema in childhood are discussed. Suppuration within the pleural cavity is frequently localized and encysted, particularly in the middle third of the thorax.

(2) An interesting case of empyema, complicating unresolved pneumonia, is described. On skiagraphy of the chest, a homogeneous opacity was seen on the left side but the heart was not pushed out. On rib resection, six ounces of pus were let out.

(3) If there is no pneumonia (meta-pneumonic empyema), operation is indicated as soon as the diagnosis is made. Nothing is gained by waiting.

(4) If pneumonia is present (syn-pneumonic empyema), aspiration, repeated if necessary, is the method of choice, until the pneumonia is resolved.

(5) The formation of a sinus after open drainage is best avoided by early and adequate drainage and avoidance of secondary infection.

I wish to acknowledge my indebtedness to Mr. L. M. Banerji and Lieut.-Col. J. C. De, I.M.S., for their valuable help and advice.

A PECULIAR CASE OF VESICO-VAGINAL FISTULA

By M. L. TRESTON, F.R.C.S., F.C.O.G.

LIEUTENANT-COLONEL, I.M.S.

Medical Superintendent, Dufferin Hospital, Rangoon

SOME two months ago a young Burmese girl, aged 20, was delivered of her first baby. Living many miles from medical attendance, the patient had to depend on the local 'Sarah Gamp' with the result that the baby was still-born, and the mother came to Rangoon, two months later, with a vesico-vaginal fistula.

The fistula was to the left, tucked under the left pubic ramus, about midway between the urethra and the base of the bladder, and was already extensively fibrosed. There was a linear scar from the posterior margin of the assumed vaginal orifice, extending to the rectum. This was soundly healed. The vagina was only one and a half inches long and there was no cervix uteri to be seen or felt. On rectal examination, the outlines of a normal uterus could be made out. At operation the apparent posterior vaginal wall was stripped completely up, and some two and a half inches from the vaginal orifice the cervix uteri was discovered. The stripped mucous membrane was cut short and partly attached to the cervix and partly to the posterior aspect of the fistula after it had been repaired. The uterine cavity was two and a half inches and there was a slight brownish discharge on passing the sound. The fistula healed by first intention, the uterus is normal and the vagina seems normal, except that it is somewhat short, two and three-quarter inches. Apparently the anterior vaginal wall and a portion of the bladder wall were torn, and the former was sutured to the bruised posterior vaginal wall, a few more stitches in the torn perineum completing the operation. This shut the uterus off completely, and it would be interesting to know what happened as regards the lochia. There was a history of fever following confinement, but it was not of a very marked type and the patient, on the whole, was fairly fit on admission to hospital.

A CASE OF BINOCULAR SUBLUXATION OF THE LENS IN A CHILD

By HANS RAJ, M.B., B.S., L.O.

Kaisar Bagh, Lucknow

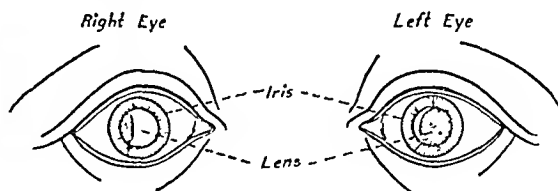
M. L., a male child, eleven years of age, brought in on the 1st August, 1934, complaining of defective vision and squint.

Vision—right eye—wearing +3.0 spherical = 6/36; left eye—wearing -7.0 = 6/24. Left eye—divergent. Cornea—clear in both eyes. Iris tremulous in both eyes, the right much more than the left. Anterior chamber—right eye outer portion slightly shallower than the rest. Slight signs of an old iritis in both eyes. Pupil—in both eyes active. In right eye outer portion showed a greyish convex crescent, looking like a dislocated lens. Left eye—normal.

Under homatropin :—

Right eye—lens was markedly dislocated, lying behind the outer portion of the iris. It was very globular, almost spherical and tags of iris tissue were adherent to its margins on all sides. The lens capsule was greyish white, the lens cortex looked translucent and the lens as a whole had an opalescent appearance. The fundus was highly hypermetropic.

Left eye—the iris was slightly tremulous. The lens was slightly dislocated outwards, the extent of dislocation being such that the portion of pupil occupied by the lens in the right eye was equal to the portion unoccupied in the left, as illustrated.



The condition of the lens was similar to that in the right eye. There was a double fundus reflex, one portion highly hypermetropic, the other myopic. In both eyes the vitreous had large floating opacities. Several large white patches of organized white exudates were present in the left eye near the macular.

Retinoscopy :—

Right eye $\frac{+8.0}{+7.0}$ Left eye $\frac{-6.0}{-9.0}$

The vision was not improved by cylinders and it was found to be -right eye with +6.0 spherical = 6/24 & J12 and left eye with -6.0 spherical = 6/24 & J4 after the effect of the homatropin had passed off. Binocular vision was not possible.

There was a history of a fall from a roof four or five years previously, but none of any eye trouble following. An ophthalmic surgeon, who saw the child some time after, prescribed only glasses, but did not mention to the father any dislocation of the lens.

A LARGE OVARIAN CYST IN A YOUNG GIRL

By G. M. IRVINE, M.D., F.R.C.S.E.

CAPTAIN, I.M.S.

Civil Surgeon, Bassein

THE following case of a large ovarian cyst in a young girl appears to be somewhat unusual :—

M. N. Y., a young Burmese woman aged 17 years and 10 months, was admitted to hospital on 24th September, 1934, on account of a large abdominal tumour.

History.—This tumour was first noticed between one and two years previously and had subsequently increased steadily in size. She had been married for nine months. She had amenorrhœa for two months. The menses previously had been regular.

Beyond a certain amount of discomfort and distress on account of the size of the abdominal tumour she complained of no other symptoms.

Examination.—There was a large tumour about the size of a full-term pregnancy filling the whole abdomen and extending to the xiphoid cartilage. The tumour was fluctuant and its outlines were somewhat difficult to determine on palpation. It was dull all over on percussion. Pelvic examination revealed nothing.

An exploratory aspiration was carried out and a few cubic centimetres of mucinous or pseudo-mucinous fluid was withdrawn.

The patient appeared to be in excellent general health otherwise.

A diagnosis of ovarian cyst or pseudo-myxoma of the peritoneum was made.

Operation.—At operation a large left-sided ovarian cyst was found filling the whole abdomen. This was partially evacuated and removed. The uterus was found to be pregnant and a corpus luteum of pregnancy in the other ovary. The duration of the pregnancy was about two months.

The patient made an uninterrupted recovery. Though abortion was feared this did not take place and the pregnancy is pursuing a normal course.

The tumour was found to be a pseudo-mucinous cyst of the usual type. It consisted chiefly of one large cavity from which over one and a half gallons of fluid were evacuated.

Comment.—I can find no reference in the available literature to the age incidence of ovarian cysts but the occurrence of a cyst of such dimensions in a girl of 17 years and 10 months is unique in my experience. The association of pregnancy with a tumour of such size is also of interest.

A STRANGULATED HERNIA

By N. K. GUHA NIYOGI, B.Sc., M.B.

Nawabganj Charitable Dispensary, Malda

A HINDU male, aged 40, came to the hospital at 5-15 p.m. on the 30th October, 1934, with a large tense scrotal swelling the size of a small football. He had severe abdominal pain and vomiting.

On examination the swelling was found to be a strangulated inguinal hernia of the left side. There was no impulse on coughing. It was reported, on enquiry, that the hernia had come down at about 1 p.m. on the same day and that the patient, as usual, tried to reduce it but in vain.

At first I tried taxis for some time without any success. Then I gave an injection of atropine sulphate 1/50th of a grain subcutaneously at about 6-30 p.m. and ordered water to be poured over the swelling constantly. I waited for half an hour and then tried taxis for a short time again. In the meantime ice was available and it was applied over the swelling for about one hour. Taxis was again tried, when the scrotal swelling began to diminish in size and it was completely reduced with gurgling sounds. The patient felt an immediate relief and was discharged on the same night.

A CASE OF POLYCYSTIC DISEASE OF THE KIDNEYS*

By A. C. DEY, L.M.F. (Cal.)

Senior Resident Medical Officer, Astanga Ayurved Medical College Hospital, Calcutta

D. G., Hindu, male, aged 40 years, medical practitioner by profession, was admitted into the Astanga Ayurved Hospital on 9th November, 1934, for the treatment of the following complaints:—

Bilateral tumour in the lumbar regions, persistent hæmaturia, and debility.

Previous history.—The patient said that he first noticed a growth in the right lumbar region about four years back. A few months after this the left side also became enlarged. There was no pain nor any discomfort in the beginning. About six months after the appearance of the tumours one morning he noticed a few drops of blood with his urine. He did not think this of much importance but that night he had an attack of severe pain in the region of the tumours. Gradually the tumours became enlarged in size and the hæmaturia used to occur off and on with occasional rise of temperature. He was treated by a village doctor without any good effect. For the last five months the patient says that the pain on the site of both the tumours has become constant and with each act of micturition he used to notice blood.



The condition of the patient was not good. He had pyorrhœa and the tongue was coated. His pulse was somewhat rapid and there were a few râles in his lungs. Blood examination revealed marked anæmia with 1,500,000 red cells and 47,000 leucocytes per c.mm.

Palpation of kidneys.—On the right an irregular fluctuating mass occupying the whole of the right lumbar and the major part of the right hypochondriac regions could be felt. A distinct gap could also be felt between the tumour and the enlarged liver. It was extremely painful to touch.

The left kidney occupied the whole of the left lumbar and part of the left hypochondriac regions and was entirely separate from the enlarged spleen. Its surface was irregular and deep fluctuations could be felt. It was also extremely painful to touch.

Examination of the urine.—The total quantity was on an average 15 to 20 ounces in 24 hours.

Physical examination:—

Specific gravity ..	.. 1034
Reaction ..	.. acid
Albumin ..	.. present in fair quantity
Sugar ..	.. nil
Phosphates ..	.. nil

Microscopical examination:—Casts—blood, hyaline and granular present.
Red blood cells—present.

A diagnosis of polycystic disease of the kidneys was made by the writer.

The patient died on the 21st November, 1934.

The two kidneys were extracted post mortem and innumerable cysts from the size of a pea to a marble were found on the surface of both. The cysts contained reddish brown fluid containing albumin, triple phosphates and fat drops.

On section very little kidney tissue could be detected. The right kidney weighed one and three-quarter pounds and the left one pound.

* Rearranged by Editor.

A CASE OF RAT-BITE FEVER

By T. R. SWARUP, F.M.S., M.B., B.S., M.R.C.P. (Lond.)
M.R.C.S. (Eng.)

Medical Officer-in-charge, General Diseases Hospital
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PATIENT aged 35 years, Hindu male, tin-smith by trade, was admitted to the medical wards of the General Diseases Hospital, Hardwar, on 9th September, 1934, with the following complaints:—

1. Fever—thirteen days' duration.
2. Pain and swelling of the joints for ten days.
3. Rash on the front and back of chest and abdomen—ten days' duration.
4. Inflamed black patch on the front of right leg at the site of rat bite, measuring about two inches by three-quarter of an inch, of twenty days' duration.
5. General weakness and prostration.

History of present illness.—Twenty days ago, the patient was sleeping at night in his cot and was bitten by a rat on the front of right leg. The site of the bite became inflamed and cedematous. Except for this, he was well for seven days. He then developed fever accompanied with general disturbances and pain and swelling of the knee and ankle joints. After two or three days of fever, he developed a rash which still persists on the front and back of the chest and abdomen.

Physical examination.—The patient is a young man of good physique; he was slightly anæmic and looked obviously ill, even prostrated. The temperature at the time of admission was 101.4°F. and the pulse rate 110 per minute. Oedema was present over his feet. The site of the rat bite was inflamed and tender. (No ulceration nor gangrene was noticed). There was a purple scarlatiniform rash on the front and back of chest and abdomen. The spleen was enlarged. The liver was not palpable. No enlargement of the glands was noticed anywhere. The joints were not inflamed but the knee, the ankle, the wrist and elbow joints were definitely tender. Nothing abnormal was detected in the circulatory, respiratory, nervous and genito-urinary systems of the body.

Pathological examination.—The blood examined for *Spirillum minus* was found to be negative. The urine did not reveal anything abnormal.

Progress report.—On the day of admission, an intravenous injection of 0.45 gramme neosalvarsan was given with the result that the temperature came down to 97.6°F. next day and continued to remain below normal until he was discharged from the hospital, i.e., nine days after admission. During this period he felt better from day to day until all his symptoms gradually disappeared. I repeated the second injection of 0.45 gramme neosalvarsan on the eighth day. On the day following this injection, the patient felt so much better that he solicited his discharge from the hospital.

Commentary.—Rat-bite fever has been known to exist very commonly in Japan. Its rarity in India, when compared to the enormous number of rats that inhabit Indian houses, has prompted me to report this case.* Moreover

* [The acceptance or otherwise of the writer's suggestion regarding the rarity of the disease in India is dependent on one's interpretation of his qualifying phrase 'when compared to the enormous number of rats that inhabit Indian houses'. In a period of 9 years, 70 cases of rat-bite fever, all diagnosed by the finding of the causative organism, *Spirillum minus*, attended the Calcutta School of Tropical Medicine; the majority of these were treated and cured by neosalvarsan or one of the allied arsenicals.

Rarity is not however the only excuse required to justify publication of a case.—Editor, I. M. G.]

the marvellous results of neosalvarsan therapy, as evidenced in this case, are worth recording.

The incubation period in this case was seven days (the usual period being five to ten days). As the patient submitted himself to medical treatment rather earlier, relapses which are such a common feature of this type of fever did not occur.

The cutaneous rash was very characteristic of the disease; this took the form of a purple scarlatiniform exanthem on the chest and abdomen. The extreme prostration and agony of the patient together with the tender joints and enlarged spleen formed a typical picture. The site of the bite did not show any ulceration nor gangrene, apart from a slight tenderness, and the glands were not enlarged.

The striking result of neosalvarsan therapy is a point to be specially borne in mind from the point of view of treatment.

Special Article

THE NEW SYNTHETIC DRUGS*

By PROFESSOR DR. MED. DR. PHIL. W. SCHULEMANN
Elberfeld, Germany

PLASMOCHIN was discovered in 1924 in the scientific laboratories of the I. G. Farbenindustrie Aktiengesellschaft in Elberfeld. Roehl noted its action in the malaria of canaries, and Sioli that in the therapeutic malaria of general paralytics. We then proceeded to investigate its effect on the naturally occurring infection in man. Roehl in Spain and Mühlens in Hamburg and the Balkans were able to show that, even under climatic conditions which favoured the development of malaria, plasmochin was therapeutically effective; and that, further, it possessed the unique property of being fatal to the gametocytes of *Plasmodium falciparum*.

Once having established these fundamental facts, it became necessary to study the therapeutic properties of plasmochin in detail. The protean manifestations of malaria rendered it necessary that this work should be carried out in different malarial districts scattered widely over the globe, and with the co-operation of critical workers.

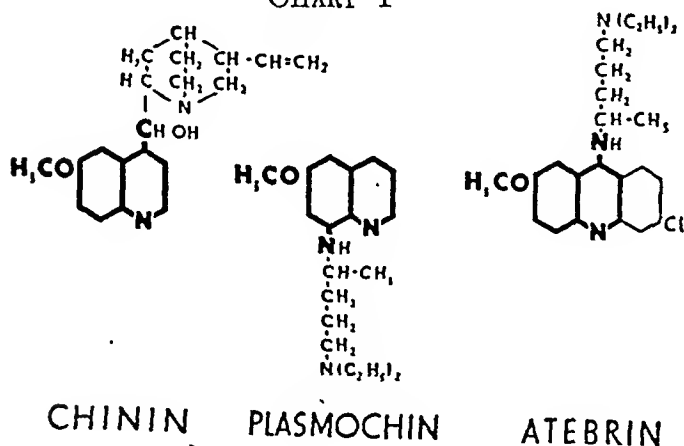
It is universally recognized nowadays that atabrin and plasmochin are effective against malaria, but, in spite of a mass of work which has been published dealing with the action of these substances, there still exists a great deal of confusion, in many respects, with regard to their value in therapeutics, sanitation and prophylaxis. A decade has elapsed since the discovery of plasmochin. Since then I have had opportunities of exchanging views with most of the experts in malarial research, and, directly or indirectly, I have become acquainted with their experiences and opinions; I have discussed their problems with them and learned their results. Basing my remarks, therefore, on the combined experiences of hospital, laboratory and practice, I would like to give you a review of matters as they stand to-day.

*By invitation of Professor Giuseppe Bastianelli, Rome, this paper was delivered by the author in the Istituto di Malariologia in Rome in the August of 1934, and will also be printed in German language in the *Rivista di Malariologia*.

† British protozoologists use the word 'gametocytes' for the sexual forms of the malaria parasites in the human host, reserving the word 'gametes' for the mature stage in the mosquito.—Editor, I. M. G.

Of critical importance for the elaboration of these new compounds was the combination of basic aliphatic side chains with the nucleus of heterocyclic compounds, using nitrogen as a link. A glance at chart I will show you that atebrian, plasmochin and quinine are

CHART I

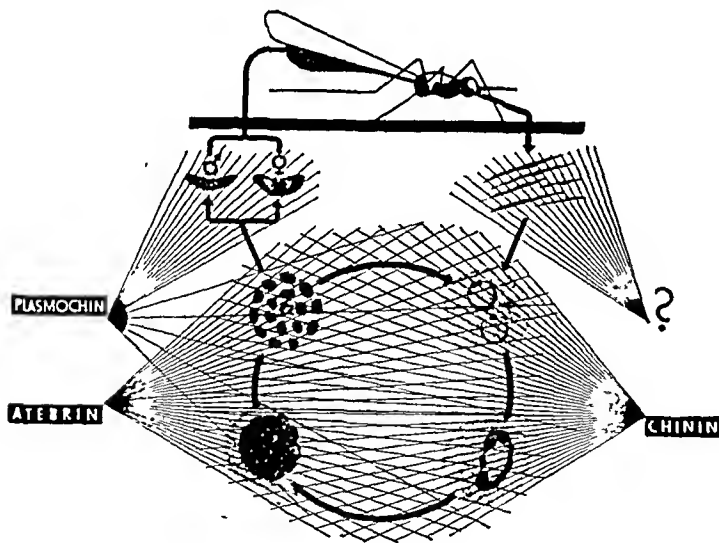


all derived from 6-methoxy-quinoline which in atebrian is changed to acridin by combining it with a benzol nucleus. The side chains in atebrian and plasmochin are identical, alike in structure and in the nature of the linking member. The positions of the side chains on the ring system differ in plasmochin and quinine, but are analogous in quinine and atebrian. Variations in the structure, position and substitution of the ring system and side chains lead to changes in the nature and intensity of the drugs' action.

In chart II where infection with *Plasmodium falciparum* is used as the example, we have a schematic

CHART II

Subtertian Malaria Malaria Tropica



résumé of the type of action which is exerted. Quinine and atebrian act in the same way on the forms of the asexual cycle only. They are devoid of any direct effect upon the sporozoites and gametes. Plasmochin exercises a profound influence on gametes, displays only a slight effect on the forms of the asexual cycle, and is without action on sporozoites. The action of the three compounds on *Plasmodium vivax* and *malariae* is not so sharply defined. Atebrin, plasmochin and quinine, it is true, possess no action against sporozoites, but, just as quinine and atebrian act on gametes as well as on schizonts in these cases, so plasmochin, while retaining its action on gametes, displays a marked effect on the schizonts.

The work of Kikuth on *Halteridium* infection—using the rice finch as a laboratory animal—has enabled us

to demonstrate, with a fair degree of precision, the presence of any action on the schizonts and gametes, so that it is now possible to gain some idea in the laboratory of the type of action which a new compound will exert. Following up a suggestion of James, experiments on canaries were developed in a manner which rendered it possible to search for a compound possessing a direct action on sporozoites, and also for a causal prophylactic in the strictest sense of this word; but these experiments have so far produced no result. There have been modifications in the plasmochin and atebrian groups made in our scientific laboratories at Elberfeld, but up to the present we have not succeeded in finding a relative of plasmochin with a pure anti-schizont action, or a member of the atebrian group acting on gametes, or in preparing a compound which might be described as a 'pantherapeuticum'.

We may now take it as definite that we have succeeded in synthesizing drugs which are effective against malaria. Like quinine, these attack a more or less specific point of the developmental cycle of the malarial parasite. We therefore speak of anti-schizont drugs, and of anti-gamete drugs, although the fields of action of the various drugs overlap to a greater or lesser extent.

These facts have stimulated and illuminated further work on malaria, both scientific and practical, in many directions. All this work, particularly the elaboration of laboratory test methods, has been made possible only by applying the results obtained by all those investigators, who, since the discovery of the malarial parasite, have provided clear facts as exemplary working bases. In recent times these test methods have been extended still further by laboratory experiments on ape malaria, by means of which, for instance, Chopra and Das Gupta, Nauck and others have demonstrated the superiority of atebrian over quinine in respect of intensity of action.

These experiments do not permit any definite conclusion to be drawn as to the action which would be exercised in malarial infections occurring naturally in man. But another fortunate circumstance came to our assistance—the possibility of making preliminary tests on general paralytics infected with malaria. Sioli, employing the strain of *Plasmodium vivax* which Wagner-Jauregg had used in the treatment of general paralysis, successfully carried out such experiments both with plasmochin and atebrian. In their classical work on the testing of quinine, Warrington Yorke and James had already availed themselves of the opportunity of working on general paralytics infected with malaria. James has developed this work still further, and has founded a malarial research station at Horton. There can be no doubt of the extraordinary value of such investigations on a disease the course of which can be exactly controlled, investigations with the precision of laboratory work. To-day it is even possible to utilize *Plasmodium falciparum*, *ovale* and *malariae*, as well as *Plasmodium vivax*, in such experiments.

In spite of this we were unable then, nor can we now, deviate from the point of view that even the results of tests on general paralytics infected with malaria do not permit us to draw any final conclusions which might be applied in practice. Clearly recognizing the situation, the Malaria Commission of the League of Nations also expresses the same point of view in the sub-title of the report on 'The Therapeutics of Malaria'—'Principles of treatment based on the results of controlled experiment'. However exactly controlled experiments on malaria in general paralytics may be, the sufferer from general paralysis is by no means a normal individual. The resistance and ability to react on the part of the host's body is gravely impaired as the result of infection of the central nervous system by the spirochæte. We know that, during the course of his disease, the general paralytic deteriorates more and more, and that he is very liable to secondary infections, such as septic

diseases, pneumonia, etc. The favourable therapeutic effect of malaria on general paralysis, which occurs now and then, is evidence of the profound mutual influence which these two diseases exert upon one another. Moreover, the general paralytics, on whom the anti-malarial drugs are tested, exist under far more favourable circumstances than the individual infected naturally. He is in a temperate climate, well nourished, and adequately protected from adverse conditions, such as cold, and bodily exertion. There is also a fundamental difference between the modern method of infecting general paralytics in which a large number of heavily infected anopholes are used one or more times, and the definitely not too intensive infection which occurs in nature.

A short example may serve to show how easy it would be to draw false conclusions, if the experimental results obtained from therapeutic malaria were taken as applicable in ordinary practice. It might be inferred from the work of Ciucu on general paralytics infected with malaria, and from that of Swellengrebel on volunteers who were heavily infected artificially, that the combination of plasmochin with quinine did not affect the relapse rate. To give an instance from practical experience, however:—The malaria station in Kasauli (British India) was obliged to close down on account of the systematic use of the very combination mentioned; so great was the fall in the number of malarial cases that there remained no more cases for admission to the hospital. Sinton and Bird and Manifold and Jarvis have reported in detail on the results obtained in Kasauli. Unfortunately the report, already mentioned, of the League of Nations' Commission on Malaria, cites Sinton's earliest work incompletely; it fails especially to show that, following treatment in Kasauli with quinine, about 70 per cent of relapses occurred as against only 8.5 per cent after plasmochin + quinine.

Much as we may congratulate ourselves on the excellent possibilities for research which malarial infection in general paralytics presents, we must guard against drawing one-sided conclusions. We may consider ourselves fortunate in possessing in therapeutic malaria a prolonged laboratory test which furnishes us with a guide, and enables us to experiment on natural malaria in a critical atmosphere. It was clear to us that in establishing the value of plasmochin and atebrian we must tread the same paths which had proved of such value in testing other preparations. The action of new preparations must, first of all, be worked out by animal experiments after which their worth in action must be confirmed in practice. No matter whether it is a drug, such as a stimulant, a hypnotic, or an analgesic that is being dealt with, or substances which are aetiological effective in infective diseases, animal experiments will yield only certain broad facts with regard to dosage and action. We know that differences in the metabolism of the various species of laboratory animals may determine fundamental differences in the pharmacological action of drugs. I need only refer, in this respect, to the action and assaying of digitalis in the frog and cat as compared with its actual action in man; and to the fact that hypnotics act differently in the carnivorous dog and in the herbivorous rabbit. You are also aware that the most effective analgesic, morphine, for man gives rise to a state of intense excitement, even in the smallest doses, in the cat. Thus we see, in all respects, that the *milieu*, or the host, on which they act, plays a part of great importance in determining the action of an arsenical preparation.

It is clear from all this that although the practical test must logically follow the laboratory experiments, it is often only on the practical application of a drug that therapeutically valuable properties are revealed, properties which were not to be foreseen in the laboratory stage. I would remind you, for instance, of the hypnotic 'luminal', which is related to 'veronal', and

which in practice proved to be an anti-epileptic. Completely analogous was the discovery in practice of the gametocidal properties of plasmochin, and of the fact that a combination of plasmochin with quinine led to a very considerable shrinkage in the relapse rate.

We therefore applied plasmochin and atebrian in practice in accordance with these considerations. In the beginning, shortly after the discovery of plasmochin, when its clinical tests were due to be carried out, I found it extremely difficult to find collaborators and a suitable field for work. At that time, anyone claiming to have an effective anti-malarial specific, which was not connected with quinine in some way or other, encountered the deepest mistrust. The actual words spoken to me by the chief of a well-known clinic—he had at one time worked under Paul Ehrlich—were: 'You may spare yourself the trouble of searching for a substance effective against malaria—you could not prove it. It would be impossible to confirm its anti-malarial action; that is why Ehrlich gave up attacking this problem. It would be of far greater importance to find, for instance, a new gold preparation effective against tuberculosis, or a specific for Malta fever. But, if you must do the other, you had best test this compound in general paralytics infected with malaria; or better still, you might try if this drug would prevent the infection of red blood corpuscles by sporozoites *in vitro*'.

In spite of this, there exists to-day an immense amount of material, difficult to review and to appraise, but which represents for the most part the careful work of renowned investigators and practitioners. I shall endeavour to give, as clearly and as simply as possible, a critical account of this work, which, I hope, will stimulate still further research so that obscure and controversial points may eventually be cleared up.

As I have already shown in chart II, the gametes of *Plasmodium falciparum*, while they are unaffected by quinine, are destroyed in a few days by plasmochin given in daily doses of 0.03 g. (gr. $\frac{1}{2}$). At the same time plasmochin exerts a slight, but definite effect on the forms of the asexual development of this protozoon. The action of plasmochin on the individual developmental forms, i.e., gametes and schizonts, in infections with *Plasmodium vivax* and *malariae*, is not so well defined as in that with *Plasmodium falciparum*. For this reason, the effect of plasmochin in the treatment of acute attacks of tertian and quartan malaria is greater and sets in more rapidly than in subtertian malaria. To obtain these results, using plasmochin only, in acute attacks, relatively large daily doses are necessary, namely: 0.06 g. (gr. 1) in tertian and quartan malaria, and 0.06 to 0.08 g. (gr. 1 to 1 $\frac{1}{2}$) in subtertian malaria. However, if continued over 5 to 7 days, these doses give rise, comparatively frequently, to unpleasant toxic symptoms, such as abdominal pains and transitory cyanosis. Nevertheless, these trials were essential in order to learn the therapeutic effects of plasmochin.

The knowledge that plasmochin, generally speaking, acted more strongly on the gametes and less so on the asexual developmental forms than quinine, and *vice versa*, induced Mühlens to combine the two drugs. Practical experience has shown the proportion of quinine to plasmochin = 30:1 present in quino-plasmochin, to be the most suitable one. The normal effective daily dose of quino-plasmochin for an adult is 3 tablets increased to 4 [corresponding to 0.9 to 1.2 g. (gr. 13 $\frac{1}{2}$ to 18) quinine + 0.03 to 0.04 g. = gr. $\frac{1}{2}$ to $\frac{5}{8}$ plasmochin daily]. This combination of the two drugs would appear to bring about the optimum therapeutic effect, at the same time avoiding all danger of toxic symptoms.

Further practical experience has brought to light two additional facts: Firstly quino-plasmochin reduces the relapse rate to 5 to 10 per cent as compared with 50 to 70 per cent after treatment with quinine only.

These figures have been established as the result of the vast practical experience of workers of considerable authority; they are therefore scarcely open to doubt. It will suffice, here, to mention the extremely valuable work of Dixon, who observed over 600 cases from 10 months to 3½ years. These cases showed 4.18 per cent relapses among 215 cases of primary tertian, 4.7 per cent out of 141 recurrent tertian cases, and 2 per cent among the subtertian cases. On theoretical grounds alone, based on pharmacology and experimental therapeutics, it is easy to understand the increased action obtained by combining two weakly acting compounds. We know, for example, from the exact laboratory experiments of Kikuth, that a combination of individually ineffective doses of Germanin and Fouadin, respectively, will bring about cures in trypanosomiasis such as could not be attained with far larger doses of the components given singly. The theoretical considerations governing the formation of double combinations does not concern us here.

The second important fact was revealed by Barber. Even in the smallest daily doses, plasmochin is capable, without actually destroying them, of rendering the gametes of *Plasmodium falciparum* non-effective to mosquitoes.

Working on the West African coast together with Rice, Barber was able to prove that, by the method developed by him, he could reduce infection among mosquitoes to zero; and in this way, to a large extent, prevent re-infection in man. Barber's discovery was further developed by Missiroli in particular. At his suggestion Jerace and Giovannola carried out research in order to discover the smallest dose of plasmochin which would render the gametes of *Plasmodium falciparum* non-infective to mosquitoes for eight days. These workers found from their experiments that a dose of 0.02 g. (gr. $\frac{1}{2}$) plasmochin on 2 days in one week would suffice under all circumstances for the prevention of infection among mosquitoes, and would, therefore, interrupt transmission to man. Widely planned and carefully controlled experiments, extending over years, were carried out in Sardinia by Missiroli and Mosna. They were crowned with complete success in this respect, thus demonstrating by means of plasmochin the possibility of carrying out successful preventive work by the use of drugs.

When we began trying out atabrin in practice, the situation had become much easier than it had been in the early years of testing plasmochin. The mistrust of synthetically-prepared anti-malarial drugs had been conquered. As Peter showed, atabrin acts on the schizonts, so that its action, in the treatment of the acute attack, may be directly observed. It was found that atabrin corresponded, in its action, to quinine, so that it was unnecessary to give it in combination with the latter. The uncomplicated action of atabrin was thus made easily demonstrable. When given in the comparatively small doses of 0.3 g. (gr. $\frac{4}{11}$) daily, the effect of atabrin was at least as good and as persistent as a 21 days' course of quinine in doses of 1.0 to 1.5 g. (gr. 15 to 22½) a day. It appeared that these short courses of treatment with atabrin were also able to reduce the relapse rate after infection with *Plasmodium vivax*. Atabrin, however, does not reduce the relapse rate to quite the same extent as quino-plasmochin. In order, therefore, to obtain similar results in respect of relapse rate to those obtained with quino-plasmochin, it will be necessary to combine atabrin with plasmochin, or to follow treatment with atabrin by a short course of plasmochin. Like quinine, atabrin is ineffectual against the formed gametes of *Plasmodium falciparum*.

It is psychologically interesting that, since its introduction, atabrin has aroused far more interest than plasmochin, so that in many places it has been thought plasmochin might be somewhat neglected in favour of atabrin. This is readily understood when it is realized that the visible effects of atabrin in the acute attack are clear and unmistakable. On the

other hand, those whose work is guided by long views soon discover that atabrin and plasmochin are complementary in their actions; so that it is only by acquiring skill in the use of both weapons that perfect results can be obtained in the struggle against malaria. In addition to all this, every practitioner is aware that quinine still retains its value as a malarial specific, and will remember with gratitude the gifts which Nature has bestowed on us in centuries gone by.

So far I have only touched upon the subject of prophylaxis in malaria. The term 'prophylaxis' is a very elastic one, and has already taken on more than one shade of meaning. It is chiefly subdivided into clinical or symptomatic prophylaxis, and causal prophylaxis.

A clinical or symptomatic prophylactic is one which, while suppressing the clinical symptoms, allows a latent malaria to arise or to persist. Quinine is the prototype of such prophylactics.

A causal prophylactic may be called upon to fulfil various conditions. In the strictest sense of the word, it should denote an agent capable of destroying sporozoites the moment they enter the human body. So far we do not possess such an agent.

However, a drug may become in effect a causal prophylactic by acting with such energy on the forms evolving from the sporozoites and on the forms of the asexual development of the parasite that the development of a latent malaria is prevented. Plasmochin acts in this way to a certain extent, and, according to James, atabrin also. Atabrin, given to general paralytics for 6 days, prevented infection with *Plasmodium falciparum* entirely; and in the case of infection by *Plasmodium vivax*, the incubation period was prolonged for several months. There is no exact confirmation in practice of this prolongation of the incubation period, nor can we explain its occurrence scientifically.

Finally, the destruction, or sterilization of gametes, so that infection of mosquitoes with subsequent transmission of the disease to man does not occur, may also be described as prophylaxis. The term prophylaxis as used in this respect is equivalent to the expression 'prevention by drugs' (medikamentöse Sanierung), for which purpose plasmochin, especially if combined with atabrin or quinine, is to be recommended.

Having reviewed our present knowledge of the actions of atabrin, plasmochin and quinine, it is essential that we should now turn our attention to the pharmacology and toxicology of these drugs in view of the possibility of toxic effects.

Once again the general remarks, which I made with regard to animal experiments, apply here with equal force. Animal experiments merely give us a few facts to go on, an indication of the lines on which to proceed; results thus obtained cannot be applied directly to man. Symptoms may arise in man which are not observed, or cannot be reproduced, in animal experiments; conversely, it would be absurd to infer that effects seen in, say the frog, would necessarily appear in man. It will therefore be my task, here, to deal only with those pharmacological and toxicological phenomena which have a practical bearing upon the toxic effects met with in man.

Plasmochin may give rise to abdominal pains and cyanosis. So far, animal experiments have yielded no explanation for the abdominal pains. Plasmochin possesses no action on the mucous membranes or musculature of the digestive tract of even the most widely differing species.

Cyanosis depends upon a reversible reaction in which methæmoglobin is formed. This may be reproduced experimentally in the cat, but not in the rabbit.

In practice, cyanosis is generally seen when relatively large daily doses, 0.06 to 0.08 g. (gr. 1 to 1½), of

plasmochin are given continuously over fairly long periods. It is more likely to come on in a patient at rest in bed, than in one who is up and about, or at work. Mild cyanosis appears in a small percentage of cases when doses of 0.03 g. (gr. $\frac{1}{2}$) plasmochin are given daily, but it disappears rapidly and completely on discontinuing the treatment. Abdominal pains are especially liable to arise when plasmochin is taken on an empty stomach; they may, therefore, be readily avoided by taking the drug after meals.

These toxic symptoms show enormous individual variation. The literature from diverse parts of the world shows that, next to constitution and nutrition, race and diet are of the greatest importance, as are, in addition, the presence of complicating diseases, such as gastric ulcer, intestinal worms, and so forth. All these factors have to be taken into consideration by the practitioner.

Another fact, which is interesting because it depends on pharmacological principles and is therefore of value in therapeutics, is that simultaneous administration of plasmochin and quinine improve tolerance to the former. Meimmi was the first to observe alterations in the pulse rhythm set up by plasmochin in very rare cases. Eichholtz showed, by animal experiments, that this was due to disturbance of conduction which could be completely abolished by quinine. These disturbances of rhythm are so rare in man that they are of no practical importance.

For the sake of completeness it must be mentioned that, among the many millions treated with plasmochin, some 20 fatal cases are described in the literature. These fatalities are more or less justly attributed to plasmochin, although it is not altogether clear to what extent these effects might have been due to hypersensitivity to quinine, which may have been taken at the same time. In these exceptional cases, an acute hæmolytic occurred even with small doses of plasmochin, similar to but not identical with that which occurs in blackwater fever following quinine. The number of these cases is infinitesimal in comparison with the number of cases of blackwater fever. In spite of many laboratory experiments, we have been unable to find a clue to the cause of this rare occurrence. I refer those who are interested in the subject to the excellent work of Amy, which I am in a position to confirm. Amy's work has proved that fluctuations in the toxicity of plasmochin do not occur, and cannot, therefore, be responsible for these altogether rare catastrophes.

Abdominal pains are occasionally experienced after taking atebirin, but they are much less frequent and not nearly so severe as those following plasmochin. The remarks on plasmochin in this respect apply equally here. After prolonged administration, atebirin gives rise to a yellow discoloration of the skin which is due to the formation of an acridin pigment. This pigmentation is of no clinical importance, it does not give rise to photosensitiveness, and disappears after a time. After painstaking research, it may be stated as definite that atebirin does not affect the liver in any way and never gives rise to jaundice. Atebrin has practically no effect upon the circulation: fatal cases are unknown. The best proof of the large margin of safety possessed by atebirin was furnished by the unintentional mass experiment of an official distributing centre, where, owing to a mistake in the label, 10 times the normal daily dose, *i.e.*, up to 3.0 g. (gr. 45) of atebirin, was dispensed. Nothing more serious than acute abdominal pains occurred. Even in such large doses atebirin did not give rise to methæmoglobinæmia nor act upon the red blood corpuscles in any way. Practical experience has shown that atebirin is particularly suitable for the treatment of malaria with blackwater fever, or with any tendency thereto.

Another fact of importance in practice is that, in many parts of the world, the simultaneous administration of 0.03 g. (gr. $\frac{1}{2}$) plasmochin and 0.3 g. (gr. 4½)

atebrin daily, gives rise to more or less violent abdominal pain in a high percentage of cases. Simultaneous medication may yet be made possible by altering the proportions of the compounds, or by special methods of encapsulation. Experiments are being performed with this end in view. For the present, I can only advise treatment with atebirin followed up by a course of plasmochin.

What guides do the facts at our disposal provide, and what are the advantages of treatment with synthetic malarial specifics?

I am in complete agreement with the pronouncement of the League of Nations' Commission on Malaria to the effect that, depending on local conditions and the end to be attained, profound modification and individualization of treatment are necessary if the best results are to be obtained in the most economical manner. Adults react differently from children. Marked differences in constitution, nutrition, mode of life, etc., exist between Negroes, Chinese, Javanese, Indians, Europeans, and so on. The properties of the protozoa in addition to those of the infected person may determine great differences in virulence and resistance. Climate, and opportunities for infection, play a large part with regard to the course of the disease, and much else. But the practitioner is accustomed to reckoning with such factors. He will take them into consideration when, in addition to quinine, the old and trusty sword of his fathers, he wields the new and sharper weapons, atebirin and plasmochin, just as we have learnt to drive cars, or fly planes, instead of continuing to plod along with the faithful horse.

In order to make the fullest use of the possibilities at our disposal, some scheme is necessary which can be modified according to circumstances. The following general scheme is put forward as a basis for treatment and preventive work:—

Atebrin + plasmochin

For the treatment of acute attack (first infection and relapse):—

5 to 7 days — 0.3 g. (gr. 4½) atebirin daily.

3 to 4 days — interval.

3 to 5 days — 0.03 g. (gr. $\frac{1}{2}$) plasmochin daily.

For prevention (general prophylaxis):—

Two days a — 0.02 g. (gr. $\frac{1}{2}$) plasmochin per day. week throughout the whole of the malarial season.

This scheme may be modified, and eventually reduced, depending on the end in view, the amount one wishes or is able to spend, and the local conditions under which the work is to be done. For example, those who do not wish to carry out preventive work will drop the after-treatment during the whole of the malarial season, while those who do not believe that plasmochin reduces the relapse rate after tertian fever will prefer treatment with atebirin only. But all who wish to reduce medication in this way must be quite clear on one point, and that is, that it is only by doing everything that is necessary that perfect results can be obtained. Those who do less must be content with inferior results.

I have already shown the kind of result one may hope for at best. The practitioner will at once ask, what is the relation between these results and cost, and what are the advantages of using synthetic compounds rather than quinine?

I can only reply that, on paper, figures may be made to prove anything. For example, comparing the effective dose of atebirin, 0.3 g. (gr. 4½) a day, with that of quinine, 1.0 to 1.5 g. (gr. 15 to 22½) a day, atebirin works out a little dearer than quinine. At the other extreme, if a 5-day course of atebirin is taken

to be the equivalent of a 21-day course of quinine, then atabrin comes out considerably cheaper. The truth lies at some intermediate point whose precise position will be determined by local factors. The calculation should take into account the saving in days in hospital, the gain in days at work, reduced personal expenses and cost of nursing, the smaller relapse rate and avoidance of re-infections; in short, all those factors must be allowed for which are of importance in assessing the value of a temporary against a permanent cure.

We hope the young twins, atabrin and plasmochin, will work energetically together to bring about the end which their worthy, elder brother, quinine, could not do alone—that is, the prevention of malaria by drugs. Despite their youth, atabrin and plasmochin are sufficiently modest to acknowledge the enormous success attained by technical preventive methods such as petroleum, Paris green, gambusia, etc., and above all by the sanitation of the soil. We have a classical example in our immediate vicinity at Agro Pontino, where, side by side with the struggle against malaria, work, bread, and the conditions of existence are being created.

The same things hold good for the prevention of malaria, which are essential in the lives of men and nations. Peaceable co-operation is of far greater value for the general progress than a conflict in which only the parasites gain.

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ERRATUM

Through a transcribing error, in Dr. Dias's paper, 'A Fatal Case of Bronchial Asthma', that appeared in our January issue, in line 23, p. 29, the words 'status lymphaticus' were printed; the words should obviously have been 'status asthmaticus'.

Referring to the author's original manuscript we find that the word he has written is undoubtedly 'asthmaticus', but we take this opportunity of pointing out that such errors could be obviated to a large extent if contributions were sent in typescript.—Editor, I.M.G.

Indian Medical Gazette

FEBRUARY

THE TUBERCULOSIS PROBLEM IN INDIA

THE extension of tuberculosis in this country is a matter that has been repeatedly brought to the notice of both the general public and the medical profession during the last three decades. In 1909, Rogers found active tuberculosis to be the cause of death in 18.3 per cent of a series of 3,000 post-mortem examinations in Calcutta; reference to health reports since this date will show that sanitarians have been fully aware of this danger, and, though they may have instituted few practical measures to ward it off, they have at least the satisfaction of having issued warnings.

Until quite recently little notice has been taken of these warnings, for a number of reasons that are easy to appreciate; in the first place emphasis has usually been laid on the future, rather than the present danger of the disease, secondly, there have been so many other more dramatic diseases to distract attention, and finally, tubercularization was accepted as the inevitable accompaniment of industrialization and urbanization of the population and there seemed to be no obvious way of dealing with the problem other than in general terms, such as the rectification of undesirable social habits and the improvement of general hygiene. Consequently tuberculosis has attracted the attention of the critical rather than the constructive politician and the demand has usually been that the 'government should do something about it'.

However, during the last few years a very distinct change has come over the situation. It is now being realized that, whether the bogey of a future widespread 'epidemic' of tuberculosis is real or not, the present position is bad enough to demand immediate action; that, even if there are one or two more important diseases from the point of view of mortality, we know how to prevent and/or treat these and much effort is being made in this direction, whereas nothing is being done about tuberculosis; that, even if tubercularization of the population is inevitable, with the example of other countries before us, we should be able to devise some means by which this process can be controlled and directed; that, if there is no *obvious* way of dealing with the problem, then it is time that we abandoned struthious tactics and looked round for some way of escape from this impasse, which way, if not obvious, is at least not inconceivable; and finally that the problem is essentially one in which the government—even if they were omniscient and omnipotent—could not effectively make the first move, that the onus of doing this falls on to the general

public through their philanthropic societies, and that it is the duty of the medical profession to guide and help them in this work.

To show the seriousness of the tuberculosis problem in India to-day, it is only necessary to quote from the last annual report of the Public Health Commissioner:—'Assuming that two per cent of the total deaths are due to tuberculous disease then nearly 150,000 persons die annually from this infection. But some experts hold that ten per cent is nearer the truth, and, on that basis, tuberculosis deaths would number 650,000. The latter is almost certainly an exaggerated figure, but it is probable that the actual number of deaths lies somewhere between these two extremes and, even taking the lesser figure, the situation is serious enough'.

The actual figures that he is able to quote from the returns of the provinces where the disease is notifiable give no indication of the gravity of the position. Further, they indicate that the disease is mainly an urban one, whereas in the opinion of many civil surgeons and administrative officers whose duties take them into rural as well as urban areas it is in the former that the position is most serious. The village chowkidar has not yet learnt to distinguish the emaciation of the phthisical from that of the chronic malaria subject, nor blood-stained sputum from the rusty sputum of pneumonia, so that nearly all deaths from phthisis are returned under the headings 'fever' or 'respiratory diseases'. Even in urban areas correct diagnosis of the cause of death falls very far short of the ideal, and in one area where a special investigation was carried out to check this particular point, it was found that nine per cent of the 'fever' deaths and twenty per cent of the 'respiratory diseases' deaths were due to phthisis, and that half the deaths due to phthisis had been returned as due to 'fever'.

It must be obvious that, if this state of affairs can exist in an urban area where medical aid is available—though it may not be taken advantage of—we cannot get much comfort from the low figures for deaths due to tuberculosis in the provincial returns. In many western countries the centre of gravity of the tuberculosis problem has now moved from the towns to the villages; in India with its huge rural population, living in large family communities whose members often sleep in closed rooms with as little cubic space per person as they would if they were living in a town, the centre is here already; urbanization has provided the spark, but it will be in the villages where the fire will eventually burn most fiercely.

Referring to the cause-of-death returns the Public Health Commissioner says 'The value of the recorded figures is greatly vitiated by the fact that correct diagnosis of the cause of death is rarely obtained and numerous deaths from tuberculosis are without doubt registered, both

in towns and in villages, as due to fevers or respiratory disease. Indeed, it may safely be assumed that the majority of the deaths from tuberculosis are registered under one or other of these groups. There exists also the general tendency to conceal the cause of death in tubercular cases for fear of social disabilities or of quarantine and other disinfection measures'.

There are three planes on which this problem can be tackled, the social, the medical relief and the research, and if any success is to be achieved it must be tackled in all three simultaneously. It is not suggested that work on these three separate planes should be independent; on the contrary it is most essential that there should be as complete co-ordination as possible, and the public health department with the aid of the voluntary societies should be the co-ordinating agency.

If the Public Health Commissioner cannot give the tuberculosis death rate more exactly than as 'between two and ten per cent of total deaths'; it is apparent that one of the first essentials is more exact information on the incidence of this disease, in the population as a whole and in its various elements. Even for limited communities we have little more accurate information. There is reason to believe that the death rate from this disease amongst women between the ages of 15 and 40 is very much higher than amongst the rest of the population (but even this information is based mainly on direct evidence) and from this it is argued—almost certainly correctly—that the purdah system and early child-bearing are contributory causes; other data regarding the incidence in different age groups, in different communities, amongst groups of people on various diets, *e.g.*, vegetarian and non-vegetarian, poor and good, etc., amongst different populations, urban and rural, hill and plain, factory workers and outdoor labourers, and so on, would provide information of immense value in apportioning the blame to the various contributory social factors. In the same way information on the relative susceptibility of these populations, which can be obtained with a fair degree of accuracy by means of the tuberculin tests, would be of great assistance. This is the type of 'field' research work that should be undertaken if not by medical officers of health at least in co-operation with the health departments.

Until a few years ago tuberculosis was not considered a suitable subject for research work in this country; the argument against it being that in other countries so much work is being done, the results of which can be applied here, that it would be better to devote our energies to diseases peculiar to India; the first part of this argument can be used equally well in favour of doing research work on tuberculosis in this country, or alternatively the whole can be used as an argument against work on some of the diseases that are considered suitable subjects

for major enquiries. Another argument used recently was that we know that unhygienic conditions of living and poor food are responsible for tuberculosis and that all we have to do is to apply the rules of hygiene; it might equally well be said that we know that anopheles mosquitoes carry malaria and that therefore we should give up malaria research and just destroy all the anopheline mosquitoes in India. It would certainly not be any more impossible than housing and feeding properly three hundred and fifty million people. We do not even know what would be ideal housing for the peoples of this country; some of the essays at this problem in the big cities in India have been disastrous. Problems that have been worked out in Camberwell cannot be applied in Cathay—or in Hindustan. One investigation that has been carried out has been on the prevalent types of tubercle bacillus, and it has been found that here the state of affairs is quite different from that in Europe. This observation has an important bearing on the ætiology of the disease, but it is quoted here only as an example of how even repetition in this country of investigations that have been carried out in other countries may throw light on our own particular problem. As Dr. Ukil, who has done much to stimulate both research and social work on tuberculosis in India, has pointed out, there are many other instances in which 'comparative' investigations of this nature would almost certainly supply important data.

The facilities for the special treatment of tuberculosis are at present grossly inadequate; there are only twenty sanatoria—some of them very ill-equipped—in the whole of the country, and an even smaller number of special tuberculosis dispensaries. In the hospitals in the large towns there are seldom any special wards set aside for this disease.

This is an aspect of the problem that seems to make a special appeal to the Indian philanthropist and we have no doubt that in time money will be found to endow sanatoria and dispensaries, but in the meanwhile special arrangements should be made in established hospitals for the treatment of tuberculous patients and for the training of students in the modern methods of the treatment of this disease. 'But', as the Public Health Commissioner says, 'it must be realized that the way to victory does not lie, except in small part, in the provision of clinics, hospitals and sanatoria. Money spent on such institutions will be money largely wasted unless the social factors involved are studied and then attacked with vigour. In the practice of more hygienic methods of living, in the provision of ample and nutritious food supplies and generally in a wider appreciation of the dangers inherent in harmful social practices will be found the way to a gradual decrease of this scourge of civilization and generally to a healthier and happier people'.

Some of the provincial tuberculosis societies and associations, notably the Tuberculosis Association of Bengal, have done valuable pioneer work, particularly in the way of publicity and education, and now the King George's Thank-giving Fund, which was founded three years ago, has given the subject an all-India status and has already done much to stimulate and

assist the provincial organizations. The recent conference that was held under the auspices of this fund should do much to stir the imagination of the general public and interest them in this problem. There is an enormous field for work of this kind and it is the type of work in which all educated people can and should assist.

Commentaries

RECENT ADVANCES IN OPHTHALMOLOGY

THE last edition of *Recent Advances in Ophthalmology** by Sir Stewart Duke-Elder is a worthy successor to the previous ones, and the author has fulfilled his promise of introducing new subjects while leaving out others originally dealt with in order to maintain reasonable proportions. The work should be available to all ophthalmologists, not only on account of the recent advances presented but also because of the extensive and valuable references to literature. The arrangement in this edition is excellently adapted to review in perspective the great problem of glaucoma, the first five chapters, part I of the book, representing the foundations on which the modern conception of this condition, as set forth in chapter XII, is built.

Chapter I deals with the vascular circulation; the arterial, venous, and capillary circulations, and their pressures in the eye. It will be remembered that as in other organs the circulation of the eye may be influenced by two factors: that of the general circulation on the local state of the intra-ocular vessels, and the independent activity of the vessels themselves. That portion of the chapter which is new concerns itself chiefly with the control of the contractibility of the small vessels by two mechanisms, nervous and chemical. While working in full interrelation, the first, under the governance of the central nervous system, is a coarse adjustment, and the second, controlled by local conditions, forms a fine adjustment. The vaso-constrictors of the uveal tract are supplied by the sympathetic; with regard to the retinal vessels the matter is not settled. There is no evidence however that the autonomic system—which is partly responsible for vaso-dilatation through its parasympathetic outflows—supplies vaso-dilatator fibres to the eye. Vaso-dilatation may occur as an antidromic phenomenon of the fifth nerve by a local sensory stimulus and a short-circuit axon reflex; or by a more general reflex involving the central nervous system. Axon reflexes acting through sensory nerves and involving vaso-dilatation through liberation of histamine are local and retained after excision of the Gasserian ganglion. Such is the mechanism of the increased intra-ocular pressure in trauma. Axon reflexes through the sympathetic involve vaso-constriction, e.g., a bloodless iridectomy in a healthy iris. The direct action of light brings about a reflex vascular tonicity, and dark adaptation the reverse, quite independent of the perception of light; it occurs in blind eyes. Chemical control is by:—(a) constrictor hormonal substances, e.g., pituitrin (a constant or tonic constrictor) or adrenaline (a rapid emergency mechanism), and (b), dilator substances locally produced by the tissues typified by histamine. The latter are products of normal metabolism. This second

mechanism is the most powerful and, in conflict with the former, dominates it. The histamine-like substances produce the 'triple response' of Lewis:—primary and local capillary dilatation, local increase in capillary permeability, and widespread dilatation of neighbouring arterioles. The histamine output is controlled by antidromic impulses descending in the sensory nerves. The triple response may be obtained by the trauma of stroking the iris, similarly it follows temporary blocking of the venous circulation, the action of toxins and capillary poisons of heavy metals, etc.; reactions of extreme importance in ocular pathology. After a marked histamine reaction any attempt to constrict the capillaries and restrict their permeability is ineffective, ('unresponsive state'), e.g., by adrenaline in a marked congestive glaucoma; on the contrary a 'refractory state' is produced in which adrenaline makes matters worse.

Permeability.—The capillaries of the eye are very impermeable to colloids, more so than laboratory animals and much more so than other human capillaries. This provision of nature is designed for the maintenance of an optically homogeneous intra-ocular fluid. Dilatation of capillaries, as a rule, produces increase of permeability to colloids, e.g., after paracentesis. This statement is not absolute, e.g., excision of the cervical sympathetic ganglion causes intra-ocular capillary dilatation but decreased permeability. Permeability is increased by various stimuli, the most common of which are histamine-like metabolites, bacterial toxins, inflammatory products, direct action of radiant energy, adrenalinic (in small doses), dionine, atropine, pilocarpine, etc.

Chapter II deals with the intra-ocular fluid, a subject about which the author has contributed much authoritative work. The text is practically identical with that of the previous edition.

Chapter III on the vitreous body refers to some of the author's latest work, as well as to other new matter and may advantageously be dealt with at some length.

Chemically the vitreous body may be regarded as a gel formed by a combination of the intra-ocular fluid with the muco-protein and residual protein (the two non-hæmatogenous constituents, shown in the author's table as supernumerary to the hæmatogenous constituents of the aqueous). The muco-protein probably functions in maintaining transparency. The residual protein has the power of gel formation even in extreme dilution. In composition the aqueous and vitreous are chemically almost identical and the apparently great difference in nature between the humours is due to these two substances, which, adsorbing water and swelling up in solution, give properties of viscosity, elasticity, and solidity, a state termed a 'gel', in contradistinction to the more dispersed or fluid state, termed a 'sol'. The intimate structure of a 'gel' is still doubtful, but according to one view the complex colloid particles (micellæ) are separated and surrounded by fine films of liquid, and arranged in a definite pattern, e.g., minute fibrillæ

* *Recent Advances in Ophthalmology* by Sir Stewart Duke-Elder, D.Sc., Ph.D., M.D., F.R.C.S. Third edition, 1934. J. & A. Churchill, Limited, London. Pp. x plus 434, with three plates (two coloured) and 150 text-figures. Price 15s.

composed of strings of molecules. These particles become hydrated, and when sufficient water has been taken up from the solution, gel formation occurs. The swollen gel particles then come to occupy nearly the whole of the volume of the colloid-water mixture. Conversely if sufficient water is lost, swollen fibrillæ of ultra-microscopic size separate out and coalesce in aggregates, to form fibrils of microscopic size, eventually developing a fine felt of long, white, fibres—a curd or 'coagel'. Recent work with the ultra-microscope is still indefinite, but it seems evident that the fresh vitreous (like many colloids) is an amorphous gel; not a cellular tissue but a cell product derived from the epithelial tissues surrounding it. The appearances seen and described heretofore in histological preparations correspond to a coagulation process in any dilute inorganic gel.

Local variations in structure.—In the region of the ciliary body there is a coarser aggregation of fibrillæ, which anteriorly differentiates out to form the zonule (embryologically the tertiary vitreous). Immediately behind the lens is the narrow retrolental space prolonged as a tubular extension—the canal of Cloquet—to the disc. This, the embryonic primary vitreous, is composed of the finest fibrillæ widely spaced (optically empty). It is delimited by a funnel-shaped zone of condensation, the hyaloid membrane in front, the wide flat tunnel mouth, continuing posteriorly into the canal of Cloquet, its neck. The main bulk of vitreous, the embryonic secondary vitreous, separated from the primary vitreous by these condensations, is intermediate in consistence. These layers are not true membranes, but condensations such as may occur on the surface of any colloid solution. The embryonic secondary vitreous, constituting the bulk of the hyaloid body, is surrounded laterally by a condensation in contiguity and continuity with the internal limiting layer of the retina.

Gels are of two types, according as the water which combines with the colloid particles is 'reversibly' united or not. There are non-reversible inelastic gels, and reversible elastic gels capable of swelling and deturgescence. They are differentiated by a study of the vapour pressure isotherm. Examination of the vitreous shows it to be a reversible, elastic gel, showing no 'opacity point', and of a hydrophilic nature (Duke-Elder, 1930). The vitreous gel can combine reversibly and freely with water so that it may swell or shrink.

The elasticity of the vitreous gel.—The behaviour of the vitreous body in important clinical conditions where it breaks down (degenerative states), or swells (glaucoma), cannot be interpreted without an elucidation of the physical changes that determine its conduct, founded on accurate measurement of the consistency of its structure. The importance of such work in relation to detachment of the retina is obvious. The technical difficulties of such a research are great. Duke-Elder and Robertson (1934) investigated the movements of a nickel particle placed in vitreous—contained in a cell on the microscope stage—by a micro-manipulator and activated by an electromagnet. Two types of movement are observed:—(a) initial rapid (instantaneously reversible), illustrating the elasticity of the gel, and (b) subsequent slow displacement or 'creep' (irreversible). Acidification of the vitreous produces an increase in the former property, so that the vitreous behaves more like an elastic solid and 'creep' is diminished. This is due to withdrawal of water from the fibrillæ, although not sufficient under the experimental conditions to modify the ultra-microscopic appearances of the gel.

Anisotropism.—The vitreous in mass is not isotropic, but shows an arrangement of lines of strain when forces are applied. The residual protein, the gelable constituent, is developed from the retina. [There seems to be a slight confusion in the text here which is interpreted as follows.]

The vitreous frequently retains an intimate association at the sites of development of residual protein particularly at the ora, so that in pathological specimens the internal limiting membrane may sometimes be observed to leave the retina and adhere to the vitreous. It is possible therefore that in pathological states of the retina the lines of force, due to parallel orientation of the micellæ of the vitreous gel, may determine a tear or detachment.

Turgescence and deturgescence.—The fundamental problem, forming the basis of study of the physico-chemical properties of a gel of protein constitution, is the determination of the iso-electric point. The proteins are ampholytes capable of acting as acids or bases under different conditions. The intermediate point, at which the tendency to carry a positive or negative charge is equalized and the protein is electrically neutral, is the iso-electric point. At this point ionization, conductivity, osmotic pressure and turgidity are minimal. Consequently these properties will vary if the reaction is varied on either side of the pH at which they are minimal. A turgescence curve for the vitreous shows five zones: An acid zone where turgescence is maximal (pH 1 to 4), an iso-electric zone (pH 4 to 6) where the curve falls to a minimum, a neutral zone (pH 6 to 8) in which the curves rise to a sub-maximum short of pH 8, a zone of instability (pH 8 and 9) in which the turgescence may rise but generally falls, and an alkaline zone about pH 9 showing another sub-maximal rise and then a sharp drop beyond pH 9.5. Of more immediate interest is the behaviour of the vitreous gel mass in the globe under varying conditions, since changes in the gel volume will be reflected in the variation of the intra-ocular pressure. The author found a minimal volume (iso-electric point) between pH 4 and 5, thereafter a rise until pH 8, between pH 8 and 9 a zone of instability in which the gel may break down, beyond pH 9 gelation is again stabilized and volume increased, until after pH 9.5 the volume sinks rapidly to a minimum on the alkaline side of pH 10.

The instability of the vitreous body.—The vitreous homogeneous gel is in a very unstable dynamic equilibrium, the consistence of which is readily destroyed by the slightest mechanical insult. *In vitro* it tends to break down if subjected to a pressure of 1.2 mm. water. A similar gel-sol transformation occurs under the influence of acid and alkaline solutions and appears to occur clinically with any upset of the vitreous metabolism. In such cases (clinically familiar), fluid separates from the gel leaving it shrunken and interspersed with a felt-work of fibrils or gossamer-like floating membranes, representing depositions of residual protein.

Chapter IV on the intra-ocular pressure contains a considerable amount of new material.

The intra-ocular pressure is determined by the hydrostatic pressure in the capillary bed, minus the difference in osmotic pressure between the aqueous and capillary plasma. The normal equilibrium level, 20 to 25 mm. Hg., is such as to favour optical efficiency. Variations in intra-ocular pressure may result from:

- (a) External pressure on the globe.
- (b) Altering the equilibrium level, by
 - (1) raising or lowering the capillary blood pressure,
 - (2) varying the difference between the osmotic pressure of aqueous and plasma.
- (c) Varying the volume pressure inside the almost rigid sclerotic, by
 - (1) varying the dilatation of the uveal capillaries,
 - (2) varying the quantity of the aqueous,
 - (3) varying the volume of vitreous or lens.

External pressure.—The normal tone of the extra-ocular voluntary muscles maintains the intra-ocular pressure at about double that which would exist were they paralysed. Stimulation of these muscles raises the intra-ocular pressure, as also does contraction of

the lid muscles. The plain muscle of Müller acts similarly but only to a slight extent in man. Artificial pressure gives a rise, followed by a fall as aqueous is expelled through the angle, succeeded by a rise due to capillary dilatation.

Diurnal cyclic variation.—Highest in early morning before rising, it falls during the day and rises again during the night to its highest peak before waking; it is probably due to greater activity of muscles during the day.

Variations with the blood pressure.—Ultimately the height of the pressure in the intra-ocular capillaries determines the level of the intra-ocular pressure. The blood pressure in the capillaries is influenced by the general arterial pressure, the venous pressure, and the local state of the capillaries. The effect of the venous pressure is more intimately felt than that of the arterial, but when the capillary pressure varies independently of the systemic blood pressure, the chamber pressure follows it preferentially. The capillary pressure is largely independently controlled by (1) a capillariomotor nervous mechanism, and (2) complex physico-chemical influences locally determined or hormonal.

The capillary mechanism helps to account for low intra-ocular pressure in cases of high blood pressure, and high intra-ocular pressure in low blood pressure (e.g., after amyl nitrite). Light causes a fall in intra-ocular pressure due to capillary constriction, this is independent of the iris movement as a rise occurs in the dark-adapted eye when under the influence of pilocarpine [vide glaucoma section].

Axon reflexes.—Those mediated by the fifth nerve, sensory or noxious stimuli produce a histamine response and rise in pressure due to dilatation of the capillary bed.

Reactive response to capillary dilatation.—As dilatation of capillaries increases their permeability, an initial rise in intra-ocular volume pressure due to the former is followed by a secondary rise due to the formation of a plasmoid aqueous with its increased equilibrium level. Such a reaction is studied after paracentesis of the normal eye, and the eye treated with atropine, pilocarpine and adrenaline, respectively. Immediately after the evacuation fall, there is a rapid rise due to capillary dilatation, then a fall, but not to normal level, then a prolonged rise due to the effect of the plasmoid aqueous. After atropine these are exaggerated especially the late rise; after pilocarpine the late rise is flattened out; after adrenaline both the rises are present but much less than in the curve of the normal eye.

Variation with the colloid pressure.—Since the aqueous and plasma crystalloids are freely permeable, differences in osmotic pressure between these two fluids can only be altered for any length of time by varying the relative concentrations of their colloid contents. Experimentally a relative decrease in blood colloids is followed by a rise in the intra-ocular pressure, but clinically, as the colloid content of the plasma is relatively stable, the converse is the usual condition met with, where the colloid content of the aqueous is raised (e.g., inflammations), and the intra-ocular pressure rises.

Volume pressure.—The globe being almost rigid alteration of the volume of any of its contents alters the intra-ocular pressure, e.g., a rise due to dilatation of the capillary bed, or a fall after massage due to diminished aqueous volume. Injection of anisotonic solutions into the blood stream act independently of the general blood pressure, e.g., injection of a hypertonic solution drops the intra-ocular pressure and injection of a hypotonic solution raises it.

The vitreous and lens.—Small changes in volume of the former are important as it occupies four-fifths of the globe. Experimentally increase of alkalinity makes the vitreous gel swell, and increase of acidity makes it shrink. Work *in vivo* in this connection has been inconclusive, but changes in turgidity can occur, and

it is probably a more important field of enquiry than the author indicated in the first edition of this work. It is almost certain that alterations in the volume of the vitreous, brought on presumably by changes in its metabolism and oxidative capacity, do occur and do profoundly influence the intra-ocular pressure. [It is satisfactory to note this attitude towards the vitreous on the part of the distinguished author inasmuch as it means the application of his exceptional gift for research to an aspect of the glaucoma problem which by its insistence has intrigued but frustrated Indian workers for years.] The writer's posterior segment clinical type of glaucoma is referred to.

The compensatory mechanism.—Normally changes in volume pressure are accommodated by the expulsion of aqueous at the angle. Great increases of swelling in the posterior segment abolish this mechanism as the angle becomes blocked. The pressure in the vitreous exits rises, the feeding arteries pile up pressure to maintain the circulation, until the circulation is maintained at practically arterial level.

Chapter V dealing with the effect of drugs upon the eye is new and important.

The autonomic nervous system does not act on involuntary muscle directly but in the case of the para-sympathetic by liberation of acetyl-choline, and in the case of the sympathetic by liberation of adrenaline at the myo-neural junctions. The skeletal muscles of animals lower than mammals are similarly activated, as also those of the mammalian embryo before the nerves have grown out. In adult mammals this response is superseded by a more efficient nervous mechanism (although if the nerve supply is cut and the nerve allowed to degenerate the primitive type of contraction occurs again), with the exception of the extrinsic muscles of the eye which still contract under the influence of acetyl-choline. The peripheral vaso-motor system is largely controlled by the anti-dromic activity of the sensory nerves which is affected through the liberation of histamine. Acetyl-choline dilates the capillaries on intravenous injection, causing a fall in general blood pressure (unless preceded by atropine, in which case a constrictor effect is produced). In small doses it lowers the intra-ocular pressure which follows the general blood pressure, just as small doses of adrenaline or pituitrin, producing vaso-constriction, cause a rise in intra-ocular pressure. The local events in the eye tending to be overshadowed by the effect on the general circulation. Large doses however of acetyl-choline produce contraction of the extra-ocular muscles which causes a sudden rise in blood pressure. This peculiar action on the extra-ocular muscles, alone amongst the voluntary muscles, it shares with nicotine. Acetyl-choline produces a contraction of the intra-ocular muscles, and stimulation of the third nerve acts through its production. The stimulus of bright light acts similarly. Acetyl-choline formed thus is almost immediately destroyed, but if eserine is administered before stimulating the third nerve or exposing the eye to a bright light, it protects or enhances the action of acetyl-choline. Eserine does not produce acetyl-choline nor does it stimulate the myo-neural junctions of the fifth nerve, but activates the already formed substance. If the oculo-motor is sectioned, or atropine is instilled, eserine is ineffective, not because atropine paralyzes the autonomic nerve endings but because it inactivates acetyl-choline, so that though the third nerve is stimulated acetyl-choline is inactivated as soon as produced and no contraction occurs; eserine under these circumstances has nothing to activate as the atropine has preferential effect. Direct stimulation of the third nerve or the muscle fibres overcomes this action of atropine, hence only drugs which act directly on muscle fibres themselves, such as the ergot-derivatives or histamine (so-called amino-glaucozan), can overcome the mydriasis of atropine. Atropine acts by inhibiting the action of acetyl-choline which normally contracts the sphincter. There is then a

contraction of the dilator by reciprocal innervation, but atropine does not stimulate the dilator, since either electrical or pharmacological stimulation of the sympathetic, central or peripheral, causes a further dilatation of the pupil already dilated to an apparent maximum by full atropinization. Also owing to this reaction a pupil dilated with atropine contracts slightly during sleep or narcosis when psychic and sensory stimuli are abolished, the moiety of dilatation due to these influences being removed. Atropine dilates the intra-ocular capillaries, increases their permeability, and causes engorgement of the ciliary region. Thus and also by mechanical interference with the angle it raises intra-ocular pressure.

Eserine is contrary to atropine in its activities. Its action on acetyl-choline has been noted. If the third nerve is sectioned it is ineffective as the tone exercised by the sympathetic over the dilator prevails in the absence of central oculo-motor impulses. In the normal eye eserine produces a rise in intra-ocular pressure partly by capillary dilatation and partly by increasing the tonicity of the recti (experimental animals). In glaucoma however the freeing of blocked drainage produces a fall.

Pilocarpine has a weaker and shorter effect than eserine, but its action is different. Like acetyl-choline it stimulates the muscle itself. When its effect wears off the sphincter shows signs of a para-sympathetic paresis (mydriasis), the opposite of the increased excitability and spasmodic contraction which is a late result after eserine.

Adrenaline produces mydriasis when injected intra-venously in very small doses. When instilled into the conjunctival sac in normal persons no mydriasis ensues, but if the sympathetic is hyper-irritable (Graves' disease, pancreatic insufficiency, section of pre-ganglionic sympathetic or removal of cervical ganglion), the excitability of the end apparatus is augmented and the drug becomes effective.

Similarly when sympathetic effectivity is augmented by cocaine, adrenaline produces marked mydriasis. When the sympathetic is thrown out of action (as by nicotine or ergotoxin), the irritability of the para-sympathetic is raised so that adrenaline contracts the sphincter (the 'inverse action' of adrenaline).

The action on the intra-ocular pressure is of considerable importance clinically in connection with glaucoma. Experimentally (1) very small doses (0.1 c.c. of a 1 in 10,000 dilution) raise the blood pressure and the intra-ocular pressure passively with it.

(2) Large doses (0.1 c.c. of 1 in 1,000 dilution) cause a rise in the blood pressure with an initial fall in intra-ocular pressure due to a definite vaso-constriction in the eye itself, followed later by a rise due to the breaking down of the relatively feeble barrier of arteriolar constriction in the eye itself.

Apart from the general blood pressure the action of adrenaline on the eye is fourfold:

1. In small doses it dilates the capillaries and raises the intra-ocular pressure.
2. In large doses it constricts the arterioles and capillaries and lowers the intra-ocular pressure.
3. In any dose it constricts the plain muscle of the orbit and raises the intra-ocular pressure.
4. It dilates the pupil, an action without significance on the intra-ocular pressure.

In man the action on Müller's muscle is negligible. Clinically it must be remembered that after the capillaries in the eye dilated by a histamine-like substance they are in a refractory phase, resistant to the constrictive effect of adrenaline.

Pituitrin constricts arterioles and capillaries, but like adrenaline this action is less marked in the eye than elsewhere and the raised blood pressure tends to break through the barrier offered by the eye arterioles.

Cocaine produces sub-maximal mydriasis and is overcome by stimulation of the para-sympathetic or the action of light. Cocaine acts as a stimulant to those tissues where the sympathetic is motor, and as

a depressant where it is inhibitory. Its action in constricting the conjunctival vessels and dilating the pupil is in the first category. The action is excitatory to sympathetic influences. [Its action towards adrenaline might be likened to that of eserine towards acetyl-choline].

Ergotamine produces mydriasis in man, but miosis in the cat.

Histamine acts directly on the sphincter muscle and contracts the pupil. It constricts arterioles and dilates the capillaries increasing their permeability to the maximum; if the capillaries are normal in tone their dilatation results in a rise in intra-ocular pressure, if they are atonic and fully dilated already the drug causes a fall by constricting the arterioles. The miotic effect is also effective in glaucoma.

Nicotine is irregular in its action on the autonomic system, depending on whether its action is most powerful on the superior cervical ganglion (sympathetic), or ciliary ganglion (para-sympathetic).

Chapter XII on glaucoma should be read in conjunction with part I of the book. The subject-matter is the same as in the previous edition, but a few points may be touched upon.

Variation in the vitreous gel is a most important factor in determining volume pressure; this has been alluded to in chapter IV, but the reaction of the blood does not appear to exert a controlling influence here. This is an aspect of volume pressure which needs thorough investigation.

The various causes of increased intra-ocular pressure discussed above (*i.e.*, glaucoma) have been frequently promoted by individual workers regardless of perspective. The author says 'The adoption of such a position is quite unphilosophical' and shows a disregard for 'the composite nature of the problem'. Perhaps the fairest assessment of the position.....is to state that an increased intra-ocular pressure may be due to one of two main causes:—

- (1) a dilatation of the capillaries 'with all that this entails'; and
- (2) 'an increase in the turgidity pressure of the vitreous and of the lens'.

Diagnosis.—The value of Troncoso's gonioscope is mentioned in observing conditions at the angle. Thiel's test with sodium fluorescein for determining increased permeability of the capillaries, which is said to be valuable in the early stages, still requires clinical confirmation. Deviations from the normal variations of the intra-ocular pressure are important in diagnosis, *e.g.*, binocular dissimilarity, the effect of decubitus, massage [homatropine], also deviations from the diurnal variation or the variations during dark adaptation, when estimated by careful and strictly comparable tonometric observations. The light sense in diagnosis (Derby) suggests that delay in dark adaptation and dulling of sensitivity to dim light form a syndrome of value. [Clinically this presents practical difficulties.]

Under the heading of treatment there are no new suggestions. That ergotamine produces miosis and a fall in tension, and can be administered *per os* over a prolonged time, is noteworthy. [Further experience with this drug is desirable.]

[The fact that it is possible to carry out prophylactic treatment in the glaucoma of epidemic dropsy has escaped the author's attention. That glaucoma is a symptom-complex of a disease which appears in epidemic-like outbreaks, and that alone in epidemic dropsy glaucoma appears to result from ætiological factors productive of a disease entity, is an old Indian observation which does not seem to have stirred the interests of research workers on this subject in Europe or America.]

PART II

Intra-ocular infections.—Excluding infections introduced through wounds or ulcers, there is a large group of intra-ocular inflammations where the ætiology is

obscure, and if organismal, is a blood stream infection. In a small number of these there may be definite invasion by the tubercle bacillus, *T. pallida*, or the gonococcus. Common pyogenic organisms may reach the eye in this way, but if so usually set up panophthalmitis. In the vast bulk of the uveal inflammations the presence of an organism in the globe has not been proven, although such lesions are usually attributed to tubercle, syphilis, gonorrhœa, or infection transferred from a septic focus elsewhere in the body. A certain amount of unconvincing bacteriological work has been done in this connection, in which investigators have tried to prove that certain organisms are responsible. It has never been shown that, from the uveal tissues of this great group of inflammations, organisms can be regularly isolated; in fact such isolations (or demonstrations *in situ*) are rare (except in the case of syphilitic keratitis). In spite of this it is customary for ophthalmologists to speak freely, if incorrectly, of tuberculous, syphilitic, septic infections, etc. Different countries and schools have their fashions in this respect. The same type of uveal lesions may be tuberculous in Germany, syphilitic in France, and due to focal sepsis in England. The protagonists of such varying aetiology usually base their belief on the results of treatment. The author considers focal infection as established, in spite of want of proof, but points out that the eye response may be:

1. Direct organismal infection.
2. Systemic intoxication.
3. Allergic sensitization.

He discusses the theory of elective localization which is analogically likely, but not proven. He considers the possibility established that an organism or its toxin can produce sensitization of the eye tissue and hence recurrent inflammatory responses under minimal activating doses. [To accept some of the allergic hypotheses it would seem necessary to assume that the eye is more prone to allergic phenomena than other highly organized tissues.] Hypotheses in this field however attractive are very unconvincing and treatment is largely by trial and error. Specific immunity methods have been largely replaced by generic protein shock tactics. The chapter leaves us with a feeling of humiliation and a certainty that our efforts at treatment in this field are largely empirical.

The ocular pigment and intra-ocular tumours.—The recent conceptions of the origin of melanin have helped to clarify our views. It would seem that the colourless mother substance of melanin (melanogen),—probably identical with 'dopa'—is, like the latter, changed into melanin by those cells of pigmented regions which possess the specific intra-cellular oxidase; the mother substance being brought to such cells by the blood stream. It is possible that melanin and adrenaline are derived from the same precursors and form alternative end-products of metabolism. If the deranged adrenals do not manufacture adrenaline more melanogen is available and appears as pigment (Addison's disease). If the cells containing the specific oxidase proliferate a localized melanoma or general melanomatosis may result. An absence of enzyme may mean albinism. The cells which exercise this chromogenic function, in so far as the skin is concerned, are the basal cells of the epidermis. Other views are held, but there is much to support the idea that these are the true melanoblasts. Pigment formed in them may migrate to the connective tissue cells of the corium and there be phagocytosed, or carried by the mesoblastic cells which thus act as melanophores or chromatophores. But the only cases in which connective tissue cells or endothelial cells give a positive 'dopa reaction' are those of tumours where the amount of melanogen is enormously increased. So far as the skin is concerned therefore the evidence points to the preponderant rôle of the basal cell layer in pigment production.

In the eye, conditions are different. The retina represents the epithelium and theoretically the choroid

ought to derive its pigment from the retinal chromatoblasts, its own cells merely functioning as chromatophores. There is evidence to show that this is not so. Before pigment appears in the embryonic choroid, oxidizing ferment is present, and they give a positive 'dopa reaction'; the normal mesodermal cells may contain even the colourless mother substance. In the eye at least melanogenesis is a function of both epiblast and mesoblast, and although ordinarily the bulk of melanogenesis is a function of the basal layer cells of the epidermis, there is no reason to think that it is an absolute hard and fast rule. In abnormal states mesodermal cells other than those of the eye may contain the oxidase. The subject is not quite so simple as it seems at first sight, and the adrenaline melanogenic alternative function of the adrenals leads up to many speculative ideas regarding the reaction of black and white experimental animals, relative hypo-adrenia in melanosis, etc. For practical purposes we may take it that as far as the eye is concerned pigmentation may be ectodermal or mesodermal and the malignant melanoses either carcinomata or sarcomata.

The treatment of ocular neoplasms by radiant energy.—The treatment of ocular neoplasms by radiant energy has become more practicable with improved technique in the use of radium. Increasing experience has enabled dosage to be determined. In treatment only the gamma rays are useful, the alpha rays are indifferent, and the burn-producing beta particles may all be eliminated by a platinum screen of 0.8 mm. thickness. A technique for intra-ocular neoplasms has been elaborated using radon seeds either on the surface of the globe or actually planted in the intra-ocular growth. Treatment of glioma seems more promising than that of sarcoma but both are in the experimental stage. Experience with the epibulbar neoplasms has been extensive and the use of radium for such growths has been well reported on. A small series of treatments using a metal holder is recorded. [No mention is made of paraffin shell holders, a simple and more generally applicable method.]

Trachoma.—The author pertinently opens chapter VIII with a reference to the accurate clinical diagnosis of trachoma and the bearing of this essential point on aetiological research. Wilson's biomicroscopic work in this respect is reviewed. The cicatricial changes of the lid and the corneal changes are dealt with. The Prowazek-Halberstæder bodies are considered of doubtful diagnostic value and of still more doubtful aetiological significance. [This is borne out by still more recent work than that referred to in the text.]

The communicability of the disease is regarded as proven, but the bacterial origin put forward by Noguchi has not been upheld by recent work on *B. granulosis*. The case for a filterable virus has little evidence so far to support it. The position may be summed up by saying that the aetiology of trachoma is not clear but is clearing. It would seem that no recent treatment has appeared which is better than the older methods.

The cornea.—The chemical constitution, nutrition, and respiration of the cornea open chapter IX. It is shown that an alkaline medium is most favourable for the transcorneal transference of the ordinary drugs, except pilocarpine. Under epithelial dystrophy, Gifford's observations alone are mentioned, which hardly does justice to this field of work.

Herpes of the cornea.—Under this heading much old ground is covered, nothing new is brought forward, and the subject-matter is open to considerable criticism to-day. To those interested in virus disease, there are obvious flaws, but of course the author is not responsible for the confusing terms or confusing statements used, such as 'herpes zoster ophthalmicus' is met with in two forms, epidemic herpes zoster and symptomatic herpes zoster. Apart from the obvious objection to the use of the term zoster in this connection, it is difficult to follow what exactly herpes

zoster epidemicus means, and those accustomed to see large numbers of cases of sporadic herpes ophthalmicus will hardly regard the illustration as suggestive of the corneal lesions in this affection. One is left wondering what exactly herpes zoster epidemicus is. Indian workers will notice the resemblance the illustration bears to certain cases of epidemic punctate keratitis. Herpes ophthalmicus may be due to filterable virus, but the identity of this virus with that of varicella or any other known virus is at present not proven. The author accepts the view that the virus of herpes simplex (labialis, facialis, genitalis, cornealis), also known as *H. febrilis*, may produce encephalitis in experimental animals, but the remainder of the work in this connection he admits is open to doubt.

Treatment of corneal ulcers by ultra-violet light.—The abiotic action of short-waved light upon the eye was dealt with in the previous edition. For practical purposes only rays below 3,000 Å. U. may be considered active, and then when used at a certain intensity (200,000 erg-seconds per square centimetre). When used within these limits an abiotic reaction is produced in the cornea after a latent period of 6 to 8 hours. The actinic rays are absorbed into the protein molecule and produce photo-chemical denaturation changes demonstrable histologically as an acidophil degeneration. The histological changes in the epithelium have been studied in detail by the author. It will be remembered that the response includes shedding of epithelium, vascularization, and the production of an inclusion-body-like change in the cell protoplasm. The reaction produces photophthalmia. Clinically we may have :—

1. Industrial photophthalmia.
2. Solar photophthalmia (snow blindness).
3. Chronic photophthalmia (continued short exposures in certain industrial workers).

The corneal cells are injured by small intensities and killed by greater intensities of radiation, the pathological change decreasing with the depth. Therapeutically the greater reaction is most useful (under proper control), in inflammatory ulcerative and degenerative corneal conditions. The good effect depends on killing the superficial cells and the organisms, the vascular reaction with invasion of the cornea, the stimulation to rapid repair of the epithelium, and possibly immunological processes stimulated by the absorption of products of cell disintegration.

In the application of treatment great care is necessary. The employment of sensitization to enable light of longer wave-length and greater penetration to be used is not satisfactory and may be dangerous. The author's technique of radiation is given and his ophthalmic radiation lamp described and figured. In hypopyon ulcers, chronic ulcers (with deep changes), recurrent ulcers, phlyctenular ulcers, and tuberculous keratitis good results may be expected. The dose is determined by first finding out that which produces a minimal erythema of the individual's skin, and regulating that for the eye in conformity therewith. The dose required to excite an abiotic lesion of the cornea being slightly less than that which produces a minimal skin erythema.

Corneal tattooing.—The desirability of depositing the stain without producing a fibrous tissue response is noted. This is so with all methods in use, no new ideas are put forward.

Keratoplasty.—Corneal grafting has recently been given an extravagantly prominent place in England both in the medical and in the popular pictorial press, on account of a limited measure of success following on the experimental work of Thomas. As the Indian lay press has blindly followed suit the author's assessment of the position at its proper value is welcome. The practical application of Thomas's experimental work to the relief of human blindness in a few cases is hardly comparable with the notable clinical successes

achieved by Elschning in a relatively large number of cases some years ago. The subject is discussed under three heads :—

1. Total keratoplasty.
2. Superficial lamellar keratoplasty.
3. Penetrating circumscribed keratoplasty.

The author dismisses the first (perhaps somewhat prematurely) as impracticable. The third certainly seems to be the method of choice. Full technical details are given. It is interesting that in interstitial keratitis the chances of success are better than in other types of corneal opacities. In such cases too, while the graft sometimes becomes opaque, the surrounding cornea clears up. [There are no real difficulties in the performance of human homotransplantation. Even existing anterior synechiae may be broken down and a successful graft accomplished, but end-results are never certain.]

Corneal contact glasses.—Introduction of ground contact glasses which can be manufactured in series has greatly advanced their practical utility, so that now it is possible to prescribe them for the correction of refractive errors. In irregular astigmatism and conical cornea, they provide a valuable method of improving vision capable of utilization by the average ophthalmologist. A practical difficulty is the expense of standard sets and of the prescribed glasses themselves. In prescribing contact glasses two separate considerations must be borne in mind :

- (1) The fitting of the scleral rim.
- (2) The optical correction.

The first is most important, as a good fit is essential to comfort without which the glass cannot be worn. The optical correction is dependent on the refraction of the eye and the corneal radius of curvature. The latter may be measured by the ophthalmometer. Knowing these it is relatively easy to ascertain the best correcting glass and the additional refractive power required for incorporation in the curvature of the glass. The method has not as yet found very general use, but has obvious advantages in certain cases, and those expert in prescribing them have proved their practical value. Their use for optical purposes must not be lost sight of by the average ophthalmologist. Apart from this, they have proved useful in protecting the cornea, treatment of corneal ulcers, plastic operations on the cornea, and relieving photophobia and spasm.

Detachment of the retina.—As might be expected the chapter on detachment of the retina is extensive. The method which Gonnin introduced a relatively short time ago has been arduously studied and improved upon by many workers. The author points out that it is an error to predicate a common mechanism in the production of detachment. Aetiological factors are discussed and the author shows that the evidence available points to the conclusion that there are two main classes of retinal detachment :—

1. The exudative type associated with inflammatory disturbances of the choroid, etc., in which the retro-retinal fluid is albuminous (at least until a hole occurs).
2. A non-exudative type in which, whatever determines the hole, the immediate cause of the detachment is the formation of a hole. There is no detachment till the hole occurs and the retro-retinal fluid is vitreous (more or less degenerated).

He does not include all detachments in these groups, but the bulk of so-called idiopathic cases. The essential aetiological factor in both is a preceding degeneration or inflammation which renders possible their occurrence although, in the case of 2, this factor may be trivial and unnoticeable till the tear and the detachment suddenly supervene. The Moorfields statistics are quoted in support of the classification of holes and

their site of occurrence. It appears that the relative frequency of the various types is:—

Round	34 per cent
Dialysis	31 "
Arrow-head	25 "
Slit	5.5 "
Irregular	4.5 "

Peripheral dialysis (disinsertion of Gonion) occurs more commonly in hypermetropes and emmetropes and is rare in high myopia. In the others the main incidence is in myopia. The round hole occurs chiefly in the temporal half, the site of election being the superior temporal quadrant, the arrow-head tear in the superior half, chiefly the superior temporal quadrant, while the anterior dialyses are, in the main, in the inferior temporal quadrant.

Treatment.—The modern treatment is discussed fully from Gonin's original conception of closing the hole and his method of doing it, to the later barrage procedures, where neither the hole, nor the elaborate machineries for its localization (the description of which takes up a large part of the chapter), play such an important part. The ground covered is all so familiar to ophthalmologists by reason of its broadcasting in recent current ophthalmological literature that we need only say that it is a very useful summary of the evolution of the modern treatment of detachment. One would like to have seen more than a reference to literature in connection with Walker's technique. The author wisely withholds judgment on any of the modern procedures as they are still in the experimental state, but gives due credit to the extraordinary advance in the treatment of detachment which igni-puncture and the methods evolved therefrom have achieved.

Hæmangiomas of retina.—The author accepts the conception that various types of hæmangiomas of the retina described in ophthalmic literature form part of the syndrome known by the name of Lindau's disease. Lindau's thesis brought the condition into line with two rather similar affections, namely, those of Bourneville and von Recklinghausen. Their resemblance led von d. Hoeve to group the three as phakomatoses. In their abnormal tissue manifestations Lindau's disease is mainly mesodermal, Bourneville's mainly ectodermal, whilst von Recklinghausen's disease is mixed.

Cataract.—In this section there is little change from the previous edition of this work except further details concerning lens metabolism. The decrease of the soluble crystallins and increase of insoluble albumoids with age and in cataract, means a decrease in cysteine, the amino-acid associated with the oxidative activity of the lens. The reducing power of the lens decreases with age or with the maturation of a cataract. But whether this diminution of cysteine is of ætiological significance, or merely an accompanying event in a degenerative process of diverse ætiology, is unknown.

The remainder of the chapter will perhaps prove a little disappointing to Indian readers and illustrations 142 and 144 are hardly suited to a work with such a title. Lacarrère's electrodiaphane is mentioned, but although the idea is not without interest and may bear fruit, it is unlikely that it will be in the extraction of the cataractous lens.

Indian workers will not agree with the statement 'all methods of intra-capsular extraction are difficult'—this is not true of forceps extraction. Many however will agree that the last word has not yet been said on the possible late effects of intra-capsular extraction on the vitreous.

Sympathetic ophthalmitis.—The two surviving theories, the anaphylactic theory and the infective theory, are reviewed in this chapter (chapter XIII). Experimental work supports the former to some extent, but the practical issue of desensitization and immunization with uveal pigment is unsatisfactory. Recent investigation by Woods of a variety of uveitis cases showed that positive intra-dermal pigment tests were found only in those patients in whom there had been a penetrating wound of the eye involving the uveal tract. On the other hand in this series a number of cases showed pigment hypersensitivity without sympathetic disturbance. The deduction is that the development of allergy seems to exercise a predisposing rôle in the ætiology of the disease, but it alone cannot be the single or determinant cause.

Møller's recent support of a tuberculous ætiology is dealt with. His thesis is based on a few cases of isolation of *B. tuberculosis* from the injured eye. His work is not in conformity with the consistently negative results which have been obtained hitherto on the animal inoculation of tissues removed from eyes enucleated for sympathetic disease. If tuberculosis is associated with the affection, the actual bacillary invasion of the eye must constitute only one-half of the story. A second infective possibility is that a filter-passing virus is responsible. This theory does not stand the test of the reproduction of the disease experimentally by infective material. The author finds neither the infective theory nor yet the anaphylactic theory all-sufficing, and, in the absence of other suggestions, considers that the truth may be in a combination, i.e., 'that a developing allergic pigment hypersensitivity predisposes the second eye to other noxious agents, rendering it more liable to infection and determining the characteristic clinical course. What the noxious agent is, or even whether it is always the same or not, is at present unknown'.

Note.—The author's wording is freely quoted, but not always in quotation marks. The reviewer's remarks are for the most part in square brackets.

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Medical News

THE PHYSIOLOGICAL SOCIETY OF INDIA

'The Physiological Society of India' was started in Calcutta in July last year, and was registered in December. This society aims at promoting and organizing researches in physiological and biochemical problems of India by enlisting the co-operation of physiologists and biochemists working in the various laboratories of India and also of those scientists and medical men who take an interest in these two basic medical sciences. The society had already arranged four ordinary meetings in which several important contributions by research workers were discussed. The office-bearers of the society are:—

President:—

S. C. Mahalanobis, B.Sc. (Edin.), F.R.S.E., I.E.S. (retd.), Professor of Physiology, the University of Calcutta and Carmichael Medical College, Calcutta.

Vice-Presidents:—

Sir Nilratan Sircar, Kt., M.A., M.D., D.C.L., LL.D., formerly Vice-Chancellor, Calcutta University.
Sir Kedarnath Das, Kt., C.I.E., M.D., F.C.O.G., Principal, Carmichael Medical College, Calcutta.
Sir Upendra Nath Brahmachari, Kt., M.A., M.D., Ph.D., Professor of Tropical Medicine, Carmichael Medical College, Calcutta.

Dr. Bidhan Chandra Roy, M.D. (Cal.), M.R.C.P. (Lond.), F.R.C.S. (Eng.), Professor of Medicine, Carmichael Medical College, Calcutta.
 Dr. H. E. C. Wilson, Professor of Biochemistry, All-India Institute of Hygiene and Public Health.

Secretaries:—

(1) N. C. Bhattacharji, M.A., B.Sc., Professor of Physiology, Presidency College, Calcutta.

(2) N. M. Basu, M.Sc., Professor of Physiology, Presidency College, Calcutta.

*Asst. Secretary:—*Dr. P. N. Brahmachari, M.S.D., M.B., P.R.S.

*Treasurer:—*Dr. B. B. Sarkar, D.Sc. (Edin.), F.R.S.E., Professor of Physiology, University of Calcutta.

The executive committee of the society consists of the above office-bearers and eleven other members representing various institutions.

TROPICAL DISEASES BULLETIN

Tropical Diseases Bulletin, Vol. 31, Supplement, December 1934. 219 pp. 'Medical and Sanitary Reports from British Colonies, Protectorates and Dependencies for the Year 1932' summarized by H. Harold Scott, M.D., F.R.C.P., D.P.H., etc., Assistant Director of the Bureau of Hygiene and Tropical Diseases. [Price 5/-].

THE fourth Supplement to the *Tropical Diseases Bulletin*, published in December 1934, contains summaries by Dr. H. Harold Scott of fifty-five medical and sanitary reports relating to the year 1932 from British colonies, protectorates and dependencies. The summaries follow the same general arrangement as in the three earlier supplements, giving for each country the year's record of vital statistics, maternity and child-welfare work, school hygiene, general sanitation, housing and town planning, etc., followed by particulars of the incidence of diseases such as malaria, enteric fever, leprosy, trypanosomiasis, yellow fever, yaws and syphilis, and the measures taken locally to combat them. Special health campaigns and investigations carried out in the various government laboratories or in the field are also noticed, and a table at the end of the summaries gives in succinct form the vital statistics and other cognate data extracted from the main body of the reports.

The records on the whole show that in spite of retrenchment of medical staffs and curtailment of expenditure on public health services the general health of the English communities has been well maintained and no appreciable increase of sickness has occurred in the native communities in the year under review. Possibly the closing down of some out-stations from which records were formerly available, and the inability of impoverished natives to travel far in search of medical help, may lend a more favourable appearance to the figures for native sickness in 1932 than is warranted by fact. Fortunately this year was comparatively free from major epidemics, and the fear that some native tribes, living at the best of times on a bare subsistence diet, might, as a result of the depression, show a greatly reduced resistance to any serious epidemic outbreak was not realized. Contemplation of the risk has however brought about a more general recognition of the dangers of malnutrition, and of the need for some effort to improve agriculture and husbandry in the interests of native populations. In Nigeria a dietetics committee was set up in 1932 to secure co-operative action by the agricultural, forestry, veterinary, geological and medical departments with a view to improving the quality of the foods eaten by the natives.

Retrenchment has had another result in bringing to the fore the question of the local training of natives for medical duties. Even in normal times the funds available for medical services are inadequate to provide enough qualified Europeans to meet the needs of the general native population. In the Gold Coast for instance there was estimated to be one government

doctor to about 53,000 persons, and this number is now even greater owing to retrenchment of staff. To meet this situation a committee was appointed to draft a scheme for a medical school and as a result a four-year course of training for nurse-dispensers was instituted to qualify natives to take charge of outlying rural dispensaries in the Gold Coast. Elsewhere in the tropics medical schools exist for training native general practitioners, notably at Suva in Fiji where native practitioners have been successfully trained for service in the Western Pacific, and in Uganda where native graduates from the medical school at Mulago now hold responsible posts. Such training however calls for experienced European medical men as teachers, a call the more difficult to meet as retrenchment proceeds, so that there is danger of a vicious circle being set up.

With regard to medical research in the colonies in 1932, the pursuance of the policy of retrenchment seems to have created an atmosphere of uncertainty as to the future, and with few exceptions the staffs of research laboratories have shown little inclination to embark on any long-term schemes of research, confining their activities for the most part to a continuance of work begun in previous years or to the solution of problems arising either in the course of routine laboratory work or in the clinical work of the hospitals.

For all interested in the medical problems of the Colonial Empire Dr. Scott's summaries of the medical and sanitary reports year by year provide a fund of information and much food for thought.

THE INDIAN HONOURS LIST

1st January, 1935

THE following are the names of medical workers in the Indian Honours List of date 1st January, 1935. We offer them our congratulations:

Knighthood

Lieutenant-Colonel J. N. Duggan of Grant Medical College, Bombay.

C. I. E.

Lieutenant-Colonel E. S. Phipson, Medical Officer, European General Hospital, Aden.

Major H. J. Rice, Indian Military Hospital, Poona.

O. B. E.

Major Ahmad Khan Sahibzada, Civil Surgeon, Hazara.

M. B. E.

Mr. Abdulqadir Khan, lately Civil Surgeon and Superintendent, Kohat Jail, North West Frontier Province.

Kaiser-i-Hind Medal

First Class

Mr. G. O. Teichmann, Medical Missionary of Baptist Mission, Chandraghona, Chittagong Hill Tracts, Bengal.

Kaiser-i-Hind Medal

Second Class

Miss M. E. Franklin, lately in charge of Women's Hospital, Rawalpindi.

Miss N. Sharpe, Darbhanga Hospital.

Miss J. F. Smith, Darbhanga Hospital.

Miss A. Whitcombe, Red Cross Society, Poona.

Kaiser-i-Hind Medal

Third Class

Mr. G. K. Karanjai, Medical Officer, Rajshahi, Bengal.

Rao Bahadur

Kizhakkekallathil Keman Nayar Avargal, Assistant Superintendent and Second Ophthalmic Surgeon, Government Ophthalmic Hospital, Madras.

Sardar Sahib

Jemadar Jasmer Singh Gill, Sub-Assistant Surgeon, His Excellency the Viceroy's Dispensary.

Khan Sahib

Sayyad Riaz Ali Shah, District Medical Officer of Health, Punjab.

Munshi Muhammad Rahim, Medical Practitioner of Hangu, N. W. F. P.

Munshi Saeed Ahmed, Civil Assistant Surgeon-in-charge, Civil Hospital, Mansahra, Hazara District.

Mr. Mohammed Noorul Haque, Sub-Assistant Surgeon, East Indian Railway, Allahabad.

Rai Sahib

Mr. Srish Chandra Sarkar, Assistant Medical Officer, Deol Jail.

Amin Chand, Baluchistan Civil Medical Department, Sub-Assistant Surgeon, Baluchistan.

Jemadar Gajraj Singh Gorkha, Indian Medical Department, Sub-Assistant Surgeon, Legation Hospital, Nepal.

Rao Sahib

Panangadam Manakatan Sridharan Avargal, Sub-Assistant Surgeon, Madras Presidency.

Mr. Trichinopoly Doraiswami Rajoo, Assistant Medical Officer, King Edward Memorial Hospital, Secunderabad.

UNIVERSITY OF LUCKNOW

We draw the attention of our readers to an advertisement in this issue for a Professor of Obstetrics and Gynaecology at the above University. We have also been asked to inform any candidates who are members of the Indian Medical Service that their applications should go through the office of the Director-General, New Delhi.

Current Topics

Coccus Infection of the Kidney: Its Rôle in the Formation and Recurrence of Stone

By HARRY A. FOWLER, M.D.

(From the *Urologic and Cutaneous Review*, Vol. XXXVIII, August 1934, p. 594)

AMONG the lesions of the upper urinary tract requiring in many cases surgical interference for its relief calculous disease is easily the most frequent, and for that very reason certainly the most important.

During the past few years progress in dealing with this problem has been made chiefly along two lines: First, the development of an operative technique which insures greater certainty in the complete removal of all the stones, together with the least damage to the structure and function of the kidney by the necessary surgical attack. During this period one notes a marked tendency toward conservatism in the management of these cases. Pyelotomy or pelvolithotomy for stone in the kidney has found an increasingly wider application and to that extent has supplanted the less conservative operation of nephrolithotomy. Resection is now successfully practised in favourable cases with the preservation of healthy kidney tissue formerly sacrificed by nephrectomy. In many cases ureteral calculi which were formerly treated by ureterolithotomy are now made to pass to the bladder by intra-ureteral manipulation, thanks to the development of these ingenious methods of modern urology.

Second, in the study of etiology. Despite the intensive study of this subject during the past ten years, the exact etiology of stone formation is still unknown. The problem remains unsolved, although important additions to our knowledge have been made. In the light of our present knowledge it is difficult to escape the conclusion that fundamentally the formation of an aseptic stone in the kidney results from a disturbance in the colloid-crystalloid balance which holds the stone-forming constituents of the urine in solution, and that this disturbance, whatever its character, occurs at the kidney level. What brings about this imbalance, what precipitates or initiates the process we do not know. Apparently this protective mechanism of the kidney is finely adjusted to the demands made upon it under normal conditions and admirably serves its important purpose under an extraordinary variety of conditions of health and disease since the vast majority of humans never suffer from calculous disease. However, one observes many patients otherwise in apparently good health who exhibit a tendency to the formation of aseptic stone

in the kidney for which no adequate explanation can be found. In these cases the affection is usually unilateral, rarely bilateral, which suggests that the ultimate cause whatever it may be is local in character.

Certain dietary irregularities have long been thought to play an important part in their development, although there was little or no experimental basis for such a theory. Recently, however, it has been shown that experimental animals, fed upon a diet deficient in certain vitamins (vitamin A), develop calculi in the urinary tract. To what extent, if any, this dietary deficiency theory is applicable to man has not been definitely shown.

Nutritional disorders producing disturbances in calcium metabolism, whereby its excretion by the kidneys is markedly increased, has been suggested as a factor in stone formation. This has been observed particularly in certain non-suppurative bone lesions, fractures, etc. The association of calcium deposits in the kidney with hyperparathyroidism has recently been brought to our attention and is supposed to be the result of disturbed calcium metabolism. These newer studies are exceedingly interesting and stimulate a renewed interest in the study of the perplexing problem of etiology of stone.

Among the secondary factors of greatest importance and about which there is general agreement are stasis due to obstruction and infection. Obstruction to the free escape of urine from the kidneys with its attendant stasis favours the retention and further growth of minute calculi. Once the mechanism of stone formation is set in motion, stasis is probably the most important single factor favouring continuance of the process. That it does not initiate the process, however, is abundantly clear from the fact that varying degrees of dilatation of the upper urinary tract are frequently observed clinically without accompanying calculous formation.

Infection is decidedly the most important complication of upper urinary tract lithiasis. With its advent the clinical picture is completely changed. It causes a more rapid destruction of kidney tissue; its persistence leads to inevitable destruction of kidney function and when bilateral to ultimate death of the patient in uræmia. Its importance as a complication is recognized in the present-day standards of treatment which require, among other things, not only the removal of all stones but the clearing up or eradication of all infections, local and focal, and the preservation of kidney function by providing adequate drainage.

The treatment of infection when present and its prevention in aseptic cases, therefore, becomes of

equal or even more importance than the removal of the stone. The study of the character of infection in a given case may and often does determine the nature of the operation to be performed.

Important, therefore, as a complication of renal lithiasis, infection as a factor in the formation and recurrence of kidney calculi is perhaps still more important. And it is in our knowledge of this relation that the greatest progress has been made in recent years.

Of the two types of renal infection, bacillary and coccid, the older statistical studies showed a great preponderance of the former; and *B. coli* is usually considered the most frequent organism occurring in upper urinary tract infections. Analyses made by recent observers, however, indicate that this preponderance is due to the greater frequency of this type of infection in the female, both children and adults. In the male sex coccus infection is proportionately much greater and equals or even exceeds that due to the bacillary type. In certain clinics with a male clientele bacteriological investigation shows a preponderance of the coccus over the bacillus type in urinary tract infections.

The natural history of coccus infections of the kidney is now fairly well understood. Since the discovery of these organisms by Ogsten in 1881 and the early studies a few years later by Albarran of the characteristic renal lesions produced by them, the whole problem has been thoroughly explored until now one may say that, with the possible exception of the tubercle bacillus, it is the best understood type of renal infection as to etiology, manner of invasion and lesions produced. Two distinct clinical groups of cases are now recognized—the acute and the chronic.

In the acute type of infection the patients succumb early to an overwhelming toxæmia unless promptly relieved by nephrectomy. Less fulminating cases are now recognized which yield to more conservative treatment. Finally, what seems to me a most important contribution to the subject was recently made. Attention was called particularly to the frequency of mild types of the infection which are frequently overlooked by reason of the difficulty in diagnosis. This is a possible sequential relationship between these acute infections with pus-producing cocci and the much more chronic infections believed to be caused by the colon bacillus group. In several cases an early pure coccus infection was succeeded by a mixture with colon bacilli. These infections usually occur as a complication of upper respiratory tract infections, septic wounds, and various cutaneous infections to which the symptoms are usually ascribed. The diagnosis is based upon mild fever, loin tenderness and pain, coupled with the demonstration of cocci in large numbers in the urine. The urine often shows little or no evidence of infection and may appear perfectly normal. The presence of infection in the urine is demonstrated by direct smear as follows: A specimen obtained with the usual precautions, second glass voided specimen in the male, catheterized bladder specimen in the female, is placed in a centrifuge tube and spun at high speed for several minutes. It is then decanted and the sediment mixed with the last few drops at the bottom of the tube is used for making direct smears on a slide. These are dried and stained with methylene blue and Gram stain. This method of demonstrating the presence of infection is both accurate and dependable and serves admirably for all clinical purposes.

CHRONIC TYPE

A very interesting discussion of staphylococcus disease is to be found in a series of papers by Ryle and by Joyce published in *Guy's Hospital Reports* (Vol. 80, April 1930). Ryle points out that, 'while staphylococcus infection most frequently remains confined to the skin in the shape of boils or a

carbuncle, it may lead to a bacteriæmia or a septiciæmia and thus to a group of sequelæ so varied that staphylococcus fever may well be regarded as one of the most protean of infective diseases—and in common with typhoid and pneumonia as a specific fever'. Blood stream infection from the superficial focal infection occurring as a complication at times takes a benign form (bacteriæmia) with a single 'fixation' abscess or several small abscesses or a severe form (septicæmia) with multiple metastases and the clinical picture of a blood stream infection. According to Joyce, the deeper structures most commonly involved are the bones, especially in children, osteomyelitis, while in adults infection of the kidneys is the most important complication. During a period of ten years 61 cases of severe staphylococcus disease were studied in 14 of which renal lesions occurred. These were, for the most part, suppurative lesions of the cortex with extension to the perinephritic tissues. In four cases the process ran a protracted chronic course resulting in complete destruction of the kidneys. It is noted that in three of these the infection was associated with a phosphatic calculus, while in the fourth the presence of a stone is suggested by the clinical findings, although a complete urologic study had not been made at the time of the report (case No. 11). These papers are important in calling attention to the specific character of staphylococcus fever as a distinct clinical entity with a definite demonstrable etiology in most cases. The danger of blood stream infection as a complication of cutaneous suppurative lesions with widely spread metastases is clearly shown. In the chronic forms of the disease when involvement of the kidney occurred, stone formation was common. It is with this association of stone and coccus infection that we are now primarily concerned.

RELATION OF COCCUS INFECTION TO STONE FORMATION

The literature on the subject discloses a wide divergence of views concerning the relation of coccus infection to stone formation. During recent years and largely as a result of clinical observation the important rôle of this type of infection in the formation and particularly the recurrence of upper tract lithiasis has been recognized. An extensive review of the whole subject was made by Hellström and published in 1924. This report has not received the attention its importance deserves. Of 13 cases of chronic staphylococcus infection, calculous disease of the kidney and ureter occurred in nine. This led to a study of the composition and structure of these calculi. It was found that the inorganic material was invariably composed of amorphous calcium phosphates, carbonates and triple phosphates. By dissolving out the inorganic constituents of a small stone with hydrochloric acid the organic material remained as a gelatinous mass which was spread upon a slide and stained. This was shown to consist of a mass of staphylococci. In order to study the relation and distribution of this organic material small stones were embedded, decalcified and sectioned. By this technic it was found that the nucleus was composed of a mass of staphylococci and that the body consisted of layers of these organisms alternating with the inorganic material.

Hrynshak found staphylococci in a stone associated with a bacillus infection of the urine. The specific character of the stone was thus identified and at the time of its formation a pure staphylococcuria must have been present. The logical explanation for the bacilluria is that these organisms were secondary invaders entirely supplanting the staphylococcus which, at the time of the observation, had completely disappeared from the urine. This observation, therefore, confirms the view of many who believe that, in mixed infections of *B. coli* and staphylococci, the latter is the original invader while the colon bacillus is a secondary intruder and the tendency is in such cases for the staphylococcus to disappear gradually, leaving the colon bacilli, as Cabot expresses it, 'in full

possession of the field'. This view is strongly supported by Hellström who states, quoting Faltin, that this observation was first made by English workers and reported as early as 1898 at a meeting in Edinburgh. The observations of Cabot and Nesbit already referred to lends support to this view.

Another question of great practical interest is whether staphylococci are ever secondary invaders. Does a kidney, once infected or subject to repeated bacillary infection, ever become secondarily infected with organisms belonging to the coccus group? The reaction of the urine and the infecting organism at the time of the original renal infection are given, as well as the same data at the time of recurrence of infection and demonstration of a stone in the upper urinary tract. The composition of the stone removed at operation in each case is also given. Complete data of this kind are as valuable and informative as they are rare in such reports. Of interest in the present connection is the fact that in 16 cases the urine was acid and colon bacilli were present during the first attack, in nine of which the urine subsequently became alkaline and cocci were the predominating organisms in the succeeding attacks. In five cases the urine was alkaline throughout the course of repeated attacks, a coccus infection being present in every instance. The calculi found in the cases presenting alkaline urine and cocci were largely phosphatic in composition.

It is evident that a colon bacillus pyelonephritis may subsequently become infected, in some cases at least, with staphylococci attended with the not infrequent complications of such chronic infections—calculus formation.

The mechanism of stone formation in infectious lithiasis has not been worked out. The significant fact is the recognition of the important rôle now attributed to infection with the coccus group of organisms in the formation of urinary calculi. Their action appears to be twofold: (1) the urea-splitting action which determines the chemical composition of the stone and (2) they form the organic framework of the nucleus and the body in the staphylococcus stones.

This appears on first reading a rather startling conclusion and yet a careful analysis of reliable data furnished by a careful follow-up over a period of years of infected cases reported upon discloses a good deal of solid evidence in its support. Coccus infection of the calculous kidney is a much more serious complication than has been generally supposed. In the light of our present knowledge and experience there is need of a complete and more careful correlation of all available clinical data obtained by an intensive study of this important group of cases. Particularly important is the study of late results and a revaluation of our methods of treatment in the light of the results which such a study reveals.

CLINICAL APPLICATION

During the past few years the important rôle of infection by urea-splitting organisms, of which cocci are the most important in recurrence of stone, has been recognized. And attempts to improve the results of surgery of calculous disease have been made by various methods of attack upon the infection when present and its prevention following conservative operations. We have come to appreciate the importance of free ureteral drainage in combating all types of infection of the upper urinary tract, acute as well as chronic. The kidney is an efficient self-irrigating organ, and under normal conditions the pelvis and calyces are constantly and thoroughly flushed out. Proper function of this admirable mechanism requires free, unobstructed drainage of the ureter. Obstruction of any degree and from any cause to free drainage at or below the pelvic outlet interferes with this function. This fact is confirmed by daily clinical observation. In combating infection, therefore, it is of paramount importance to maintain adequate

drainage. For this purpose the ureter catheter fulfils one of its most important uses. Intermittent ureteral catheterization or the indwelling ureter catheter permits the direct application of various antiseptic solutions to the renal pelvis. I am not greatly impressed with the value of these from my own experience, but am inclined to believe the free drainage secured by the catheter is much more important.

Recently Randall has suggested the topical application of one per cent phosphoric acid to the renal pelvis for prevention of earthy (triple) phosphatic calculi. This suggestion is based upon the observation that 'bacteria often have a very limited range of chemical reaction in which they thrive; change their cultural habitat and bacteriostatic or bactericidal action is obtained'. The specific character of these recurrent stones is thus recognized; the treatment suggested aims at their removal or prevention by changing the reaction of the urine and in this way eliminating the specific infection. Various solutions, chiefly acids, have been used by other observers both by mouth and for topical application in an effort to dissolve pelvic and ureteral stones. Keyser states he has recently been interested in the organic acids, malic, citric and tartaric. Experiments with malic acid have yielded some interesting results.

In lightly-infected cases otherwise favourable for a conservative operation, pelviolithotomy, for example, an internal antiseptic supposed to be effective against the coccus group, such as pyridium, seranium or acriflavine should be used as a routine. Intravenous neosarsphenamine given the day before operation may be helpful in reducing infection. We have recently employed this combination with apparently good results. These patients must be followed with unusual care after operation and every effort made to completely eliminate infection. In a recent case of infected ureteral stone a rather severe infection associated with dilatation of the pelvis cleared up completely after operation under pyridium alone. Another case secondarily infected following leakage for ten days cleared up completely and promptly under the same simple treatment. With a better understanding of the problem presented by this group of cases and a keener appreciation of our responsibility it is my belief that our present methods of treatment suffice to cope successfully with the situation in the majority of cases without resorting to more radical surgery which appeared necessary only a few years ago. However, in the occasional case where the disease is limited to one kidney which has become seriously compromised by deep-seated and destructive inflammation nephrectomy is the operation of choice and is, in fact, a conservative operation in so far as preservation of the opposite healthy kidney is concerned.

Carbarsone

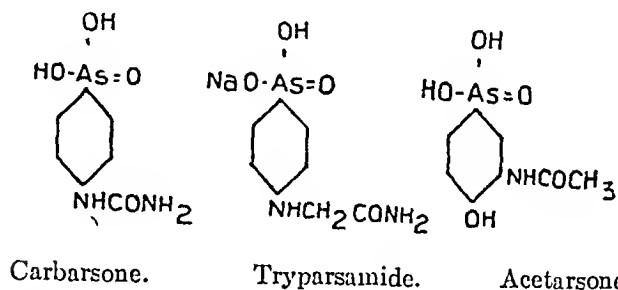
(Abstracted from the *Journal of the American Medical Association*, Vol. CIII, 28th July, 1934, p. 258)

CARBARSONE is a product of Eli Lilly and Company, originally proposed by Leake and his collaborators as a therapeutic agent in intestinal amoebiasis. In view of subsequent publications on the use of this therapeutic agent and a report from the A. M. A. Chemical Laboratory that the product is satisfactory chemically, the Council has now accepted Carbarsone-Lilly for inclusion in N. N. R. and has authorized publication of the following report:

Carbarsone is designated chemically as *p*-carbamido-phenylarsonic acid. It is closely related to tryparsamide; in common with both acetarsone and tryparsamide, it is a pentavalent arsenic compound.

An investigation carried out at San Quentin prison by Reed and his associates on the incidence of amoebiasis in newly-admitted prisoners and in the food-handling force of the institution, and the treatment of these cases with vioform or carbarsone, has been the subject of a series of progress reports. The final

report covers ninety-two treated cases, of which twenty-nine were removed elsewhere before any significant follow-up period could be established. Of the remaining sixty-three, thirty-one had been treated with vioform and thirty-two with carbarsone. Stool



examinations (smears stained with iron hæmatoxylin) were made on three consecutive days at intervals of from two to four weeks on each patient. The vioform group was followed for an average period of 13.2 months (range, 7 to 18½ months); all but three of these patients remained negative (the latter were found to be positive at eight, ten and sixteen months, respectively). Of the carbarsone group, all thirty-two remained negative for an average period of 19.6 months (range, 13½ to 22 months). Of the original series of forty-two cases treated with carbarsone, one severe case did not remain negative after two courses. Of four others in which 5 gm. of carbarsone was given in ten days, two showed recurrences six and seven weeks, respectively, after treatment. After a second course of carbarsone, these two remained negative for the one month of observation. All four patients were paroled before the follow-up period could be completed.

It appears from this unusually well controlled study, in which the possibility of reinfection was apparently relatively low, that carbarsone may be an unusually effective treatment in amœbiasis.

Presson presents results in forty cases of protozoiasis treated with carbarsone (eighteen *Entamœba histolytica* alone, five *Entamœba histolytica*, associated with other protozoa; the remainder were *Entamœba coh*, *Entamœba nana*, *Trichomonas*, *Giardia*, *Chilomastix*, singly or mixed). One course of 0.25 gm. of carbarsone twice a day for ten days cleared all but two cases (one *Giardia*, the other *Entamœba histolytica*, *Chilomastix* and *Trichomonas* mixed); from six to fifty follow-up examinations were made in each case but the periods of observation are not stated. The only side effects reported by Presson were flatulence and 'hyperperistalsis' of the intestine but 'no excessive diarrhoea'.

Anderson and Reed state that about 10 per cent of patients with amœbiasis are found to be refractory to carbarsone orally. These are cases usually of acute dysentery or diarrhoea in which motile amœbas are found. The authors present twelve cases in which carbarsone was administered rectally (200 c.c. of a solution containing 1 per cent of carbarsone and 2 per cent of sodium bicarbonate) as an overnight retention enema, on alternate days for five such treatments. Usually a sedative was administered to permit retention of the enema; three patients could not retain the dose. Oral treatment was interrupted to avoid overdosage. The enemas relieved the acute symptoms but the amœbas were not eradicated. Eight of these patients received carbarsone by mouth subsequently; four had one course, two two courses, and two three courses. In addition, adjuvants such as bismuth subcarbonate, vioform, acriflavine, heptylresorcinol and emetine were used variously in seven patients. The latter, and five patients receiving carbarsone alone, remained amœba-free for an average period of five and one-fourth months; but two of the first group

were found positive again at six and twelve months, respectively. These authors believe that patients should be followed for a period of two years after completion of therapy. Of course, in a period as long as this, as has been pointed out, it is impossible to distinguish recurrence from reinfection.

Anderson reports eighty-eight cases of amœbiasis in Panama treated with carbarsone. Eighty adults received a total of 5 gm. in ten days; six children received about one-half the adult dose; two patients did not complete treatment. Thirty-seven of these cases were followed for a month (six or more specimens) and all but one were cleared and remained so for the period of observation. The data on the others are incomplete.

Chopra, Sen and Sen (*Indian Med. Gaz.*, Vol. LXVIII, p. 315) investigated the effectiveness of carbarsone in thirty-one cases of amœbiasis treated in Calcutta. Twenty-three had five or more (most had six) negative examinations on different days following cessation of treatment; four patients appeared to be cleared but the authors consider the number of post-treatment examinations insufficient. There were four failures. It is obvious that, as the authors admit, the criterion of cure used by them is not adequate for reasonable certainty of an ultimately satisfactory result. Nevertheless, the results obtained, as judged by this method, appear to be better than those obtained in India with the other agents commonly used. Chopra and his associates agree with the oft-repeated claim of the California workers that carbarsone is superior in therapeutic efficacy to acetarsone.

Anderson and Reed report one case of toxicity from carbarsone. This consisted of icterus, pain in the right upper quadrant, enlarged tender liver, numbness of the hands and legs, weakness and 'generalized aches' in a patient who one year previously had had an enlarged tender liver following carbarsone therapy. The symptoms cleared in five days with no apparent residual effects. In addition, seven cases of gastric irritation occurred with a preparation purified by a different method, since abandoned.

Anderson and Reed state that they have seen no evidence of skin, optic nerve or renal damage following the use of carbarsone clinically. The possibility of optic nerve destruction has been particularly emphasized, as carbarsone contains a modified amino group in para position to the arsenic atom, similar to the arrangement in tryparsamide. Farrington (reported by Anderson and Reed) administered graded doses up to totals of 150, 300, 600, 800 and 1,200 mg. per kilogram over a period of forty-eight weeks (alternating four weeks of administration with four weeks of rest) without evidence of toxicity in thirty-three cases as determined by clinical examinations (including visual field determinations) and tests on blood and urine, all at intervals of four weeks.

In one case reported to the Council, 0.25 gm. was given twice a day for six days. On the fourth day severe headache developed, which persisted in milder form for the two subsequent days, on the fifth generalized itching occurred and on the sixth a light scaling erythematous rash was noted on the forearms. Administration was stopped and symptoms of toxicity cleared up largely within forty-eight hours.

Dr. Frank Smithies, in a discussion before the Chicago Society of Internal Medicine, 28th May, 1934, and in a subsequent written communication, reported several cases of severe toxic reactions from the administration of carbarsone in 0.25 gm. capsules:

'1. One patient with acute amœbiasis took less than ten capsules of carbarsone and within a week had a dermatitis of the exfoliative type over the hands and arms.

'2. One patient took twenty capsules of carbarsone (three capsules daily) and experienced, after the fifth

day, pulmonary edema, edema of the larynx, chemical sore throat and very pronounced sneezing, lacrimation and running of the nose.

'3. One patient took carbarsone five days on and one week off (two capsules a day) and six weeks after treatment was begun came to me with a history of acutely swollen ankles, knees and wrists—a condition which the patient had never experienced before and which came on about the fourth week following the beginning of carbarsone therapy. When I saw him he had, in addition to moderate swelling about the soft parts of the joints named, a liver four finger-breadths below the rib margin (it was tender) and a spleen at least twice the normal size (it was readily palpable).

'4. One patient, who took seven capsules of carbarsone over a period of three and one-half days, developed faulty vision and photophobia. There was moderate swelling of the eyelids, slight puffiness of the face and granular casts with a trace of albumin in the urine. Ophthalmoscopic examination showed moderate papillitis and moderate retinal edema.

'5. Several patients experienced aggravation of diarrhoea, nausea and vomiting and vague pains, in the stomach region, after from two to eight carbarsone capsules had been taken. One of these patients developed slight but definite icterus on the fourth day after beginning carbarsone therapy (two capsules a day)'.
'

Dr. Smithies deprecates the present tendency toward the indiscriminate administration of fixed total doses of anti-amoebic drugs without regard to the sensitivity of the individual patient (or to the tissue damage that such remedies may produce) and often even without adequate diagnosis. He points out that adequate therapy often requires the use of a number of remedial agents and cautions against placing too much reliance on single 'specific' remedies.

Reed emphasizes the necessity of determining by suitable tests the presence or absence of hepatitis (and impairment of renal function), guarding the use of arsenicals accordingly. He warns against over-standardization of treatment and points out the frequent necessity for adjuvant therapy, such as alternating courses of vioform with those of carbarsone, with ten-day rest periods intervening; tannin preparations and bismuth subcarbonate in cases presenting persistent dysentery or diarrhoea; emetine in amoebic hepatitis; dietary adjustment; colonic irrigations with antiseptics and other measures for secondary infection; proper surgical intervention when indicated in resistant cases.

Reed and Johnstone summarize the results in 330 cases: 'Our conclusion is that carbarsone is a valuable addition to the treatment of amoebiasis because of an effectiveness at least as high as any other single drug, combined with low toxicity, capability of oral administration, non-interference with ordinary pursuits of the patient, lack of adjuvant requirements such as bed rest, diet, hospitalization and other drugs, and finally its relatively low cost. We have found a certain number of patients resistant to carbarsone and all other therapy'.

It appears that carbarsone is a valuable addition to the anti-amoebic armamentarium. It must be considered, however, that not a few patients are resistant to this agent as well as to other amoebicidal drugs, and that, while toxic reactions appear to be uncommon, a few serious accidents have occurred after administration of the usual therapeutic doses of carbarsone. The individual susceptibility to arsenic compounds of each patient must be evaluated and evidences of toxic manifestations must be watched for carefully, both during the period of therapy and, in view of the slow excretion of the administered arsenic, for a reasonable time afterward.

Immunization against Yellow Fever

(From the *Lancet*, 3rd November, 1934, Vol. II, p. 994)

THE discovery by Max Theiler in 1930 that mice are susceptible to yellow fever on intracerebral inoculation opened a new chapter in the history of immunization against this disease, since the use of mouse-fixed or neurotropic virus for protecting human beings seemed to overcome many of the difficulties attendant on the use of the ordinary or viscerotropic strain of yellow fever virus. Two methods of vaccination have been employed. In the first, initiated in New York by Sayer, Kitchen and Lloyd, a combination of titrated human immune serum and neurotropic virus was injected. This method has been used by Findlay in London and by Pettit and Stefanopoulou in Paris, where, however, instead of human immune serum one prepared from the horse has been employed. Rather more than 400 persons have now been immunized by this method and the immunity has been found to last for well over two years.

In 1932 Sellards and Laigret began vaccinating volunteers with small doses of neurotropic virus alone, but the reactions were in some cases very severe. Laigret therefore proposed to attenuate the virus by exposing the infected mouse brains to a temperature of 20°C. for four days, two days, and one day—a process analogous, according to Laigret, to that used in attenuating rabies virus. The brains were then either preserved in glycerine or desiccated, frozen and kept in the ice-chest. After titration in mice they were inoculated into volunteers. Three inoculations were given at intervals of 20 days; the first consisted of 1 c.cm. of a 1 in 100 dilution of four-days' mouse brain, the second of 1 c.cm. of a similar dilution of two-days' mouse brain, and the third of 1 c.cm. of a similar dilution of one-day's mouse brain. Recently Laigret has reported the results of immunizing by this method more than 3,000 people, mostly whites, in French West Africa. The results would perhaps have been of greater value if by previous tests an attempt had been made to ascertain whether any of these persons were previously immune. Although immunity was satisfactorily produced, about a third of those immunized developed febrile reaction on or about the sixth day, commonly after the first, more rarely after the second or third injection; in two cases there were symptoms of cerebral involvement. These results are perhaps not unexpected, since the injection of living, even though attenuated, neurotropic yellow fever virus in the absence of immune serum has very considerable danger.

Dr. G. M. Findlay records experiments on monkeys injected with infected mouse brains attenuated and titrated by Laigret's technique which show that brains attenuated for four days at 20°C. either give rise to circulating virus, or, if virus cannot be detected in the blood stream, they fail to immunize: brains attenuated for one or two days always give rise to the presence of living virus in the blood. After one of the three injections, therefore, virus is almost certain to circulate in the blood stream although, owing to the wide variations in individual susceptibility, it need not necessarily give rise to clinical symptoms. Any person with neurotropic yellow fever virus circulating in the blood stream, however, is a potential danger both to himself and to the community in which he lives. Personal danger lies first in the fact that the barrier between the blood stream and the brain may sometimes break down so that cerebral lesions result. In animals, as mentioned by Dr. Findlay, there have been instances in which, after subcutaneous or intraperitoneal inoculation of neurotropic virus, encephalitis has developed in the absence of any cerebral trauma, and Laigret himself records involvement of the nervous system in man. A second personal danger lies in the fact that in some people the neurotropic virus may give rise to jaundice and albuminuria as well as to

leucopenia and bradycardia. Evidence is also accumulating to show that in animals the neurotropic virus is capable of producing visceral lesions and is pantropic rather than strictly neurotropic. It is, therefore, not impossible that neurotropic virus inoculated subcutaneously into man may on occasion revert to the viscerotropic strain. Finally, any person with neurotropic virus circulating in the peripheral blood stream is a potential danger to the community if he lives in a country such as West Africa, where *Aedes aegypti*, the mosquito vector of yellow fever, is also present. Although Mathis, Laigret and Durieux (1934) state that no epidemic followed their mass immunization, experiments by Davis, Lloyd and Frobisher (1932) and by Roubaud and Stefanopoulo (1933) have shown that mosquitoes can take up the neurotropic virus from the blood stream of monkeys and transmit it to other monkeys, while Davis has recently demonstrated that at every bite the infected mosquito injects at least 100 times the minimal infective dose for a mouse. Every person, therefore, vaccinated with living neurotropic virus alone should, if resident in a mosquito-infected country, be kept screened from mosquitoes from the time of inoculation of virus until the development of immune bodies in the blood—a period, if Laigret's method be employed, which might last for some weeks.

Hence it seems very doubtful if, with our present knowledge of the potentialities of the neurotropic yellow fever virus, mass immunization with living neurotropic virus alone can in any way be justified, more especially when carried out in a country such as West Africa where *A. aegypti* is present. On the other hand, immunization with living neurotropic virus and immune yellow fever serum provides, as shown by many observers, a reasonable method of reducing the possibilities of virus circulating in the blood stream. It will be the safest and most satisfactory means of immunization until such time as it becomes possible to produce a virus, which is antigenically potent, but devoid of pathogenicity.

Ear-Ache and its Treatment

By JOHN F. O'MALLEY

(From the *Practitioner*, Vol. CXXXIII, September 1934, p. 234)

PAIN is nature's herald of distress, a signal, a call for help. Its severity is not always a true measure of the gravity of the complaint which calls it forth, as it may be conditioned by such factors as the type of infection, the anatomical structure of the tissues attacked, or even the tolerance of the patient. This is well exemplified in the case of middle-ear tuberculosis which, though a grave disease, is as a rule painless. Pain is excessively severe in inflammation which tends to end in suppuration, and cutaneous streptococcal inflammations, such as erysipelas of the ear and scalp, are extraordinarily sensitive to touch. Tissues which yield easily to inflammatory engorgement are less prone to intense pain than those in which oedema is very circumscribed by virtue of their structure, and so for the latter reason all the adnexa of the hearing apparatus are peculiarly subject to severe pain when inflamed. This applies particularly to perichondritis of the pinna and meatal tube, as well as to inflammation of the Eustachian tube and tympanic membrane. Yet, again, there may be a great predominance of pain in one ear, although the clinical signs may indicate the same involvement in both, hence the wisdom of a bilateral examination in all cases.

Pain in the ear may be associated with two general groups of affections: the first being direct or localized and due to inflammatory disease in any part of the auditory apparatus; and the second indirect or referred, arising from disease in adjoining portions of the scalp, jaws, nose, or throat. For instance, in the

former a definite lesion will be discoverable in some portion of the hearing mechanism by anyone who has the necessary skill, and, if none can be found to explain the ear-ache, the cause must be sought in regions from which pain may be referred to the ear. In this connection it is worthy of note that a lesion anywhere in the area of distribution of the trigeminal or glossopharyngeal nerves or in that of the superior laryngeal branch of the vagus, may cause referred ear-ache. A classification of the two groups may therefore be usefully set forth as below:—

(1) Direct or localized pain.

- (A) External ear. (a) Pinna (b) Meatus

- (1) Herpes
(2) Eczema
(3) Erysipelas
(4) Perichondritis
(5) Furunculosis
(6) Impacted wax
(7) Exostosis

(B) Eustachian tube

- (C) Middle ear (a) Acute inflammation and suppuration.
(b) Chronic inflammation and suppuration.
(c) Non-suppurative disease (catarrh, otosclerosis).

(D) Mastoid.

(2) Indirect or referred pain.

(A) Teeth and alveolus.

- (B) Nasal accessory sinuses { (a) Maxillary } Suppuration,
(b) Sphenoidal } malignant
(c) Ethmoidal } disease

(C) Nasopharynx.

Pharynx Tuberculosis, carcinoma.

Larynx

Œsophagus—post-cricoid carcinoma.

(D) Fauces

{ Tonsillitis (acute, chronic,
calculus).
Quinsy.

(E) Tongue—ulceration.

(F) Temporo-mandibular arthritis.

(G) Neuritis of great auricular nerve.

Pinna and external meatus.

Herpes affecting the external ear alone is a rare condition, but is more common in association with that of the face or neck. Pain of a shooting or stinging character may precede the outbreak of vesicles by some days and is usually accompanied by some pyrexia and general febrile symptoms. It may accompany an attack of pneumonia. Cold compresses relieve the pain, but these should be replaced by a dry starch powder and cotton-wool dressing on the appearance of the vesicles.

Eczema, when acute and in the weeping or vesicular stage, causes a burning sensation, which is relieved by the free application of calamine lotion.

Erysipelas.—This condition is passed over rather lightly in the textbooks on diseases of the ear, but in my opinion it deserves serious attention on account of the diagnostic traps in which it may involve the unwary. It is generally a part of a cutaneous infection of the scalp in the mastoid region or of the face in front of the ear. The portal of infection is frequently a small eczematous fissure in the external meatus and the cutaneous involvement may be first noticed over the mastoid with a burning pain in the ear. As it is accompanied by high fever, an investigation of the site of pain (if localized around the back of the pinna) may lead to the diagnosis of mastoiditis, as this region is usually red, slightly oedematous, and exceedingly tender to touch. I have come across about 20 cases in as many years and was actually called upon to operate on 4 of these as acute mastoiditis, but was fortunately able to avoid doing so owing to the lesson provided by the first case.

It was one of chronic middle-ear suppuration under my care in a military hospital during the war and

seen by me two days before I was summoned urgently, late one evening, to operate for acute mastoiditis. The scalp had been extensively shaved in preparation for operation, revealing redness and edema of the scalp far beyond the mastoid region. It was all very tender to touch, even in areas remote from the mastoid and this revealed its true nature.

All my later cases have provided similar areas of tenderness far beyond those found in mastoiditis.

The pulse and temperature ratio is also peculiar, in that it resembles that of enteric fever, which is quite unlike the ratio seen in acute mastoiditis or any of its complications. The pain is relieved by the application of cold water, which was first advocated by Hippocrates. It is still as effective as any of the newer local remedies; but covering the part with starch powder and wool is more convenient; this, and the injection of a specific serum, constitute the modern method of treatment.

Perichondritis of the pinna is relatively rare; it may arise from a scratch or the spread of infection from a boil in which event the whole outer ear, with the exception of the lobule, may be involved. In many cases of furunculosis in the outer end of the external meatus, a small area of perichondritis will be seen, posteriorly, in the concha, but it remains limited to this area, although it adds considerably to the pain. Involvement of the whole pinna assumes all the characteristics of a cellulitis, and there is the danger that the cartilage may be destroyed with resulting deformity. Heat is the best early treatment for the relief of pain, but, if edema is present, several short incisions to relieve tension, under general anaesthesia, are indicated to prevent cartilage destruction. Some surgeons advise puncture right through the pinna in several places with a small scalpel, after first painting the whole surface with iodine or picric solution.

Furunculosis.—This is a very common affection of the external meatal tube, the boil having its origin in a hair follicle or ceruminous gland and it may be preceded by a slight eczema. In its developing or pre-suppurative stage it is usually exceedingly painful owing to the restriction of inflammatory edema caused by the closely adherent skin of the meatus but on the escape of pus the pain subsides. Although deafness due to blocking of the meatal passage may be present and noticed by the patient for a day or two, pain is the outstanding symptom for which relief is sought. Cold or heat will modify the aching. Some surgeons prefer the former and apply Leiter's ice coil. Personally, I prefer heat and employ some means which insures the maintenance of the highest bearable temperature for as long a time as possible. Fomentations cool off rapidly and need too frequent renewal, so to fulfil this need I use antiphlogistine or similar preparations and find them quite satisfactory. Five per cent glycerine acid carbolic used as drops has a soothing and abortifacient effect, being at the same time antiseptic and analgesic. It, however, tends to cause peeling of the meatal epithelium, which may possibly lead to re-infection later and recurrence. If used, and it is decided to apply heat subsequently, all traces of the carbolic should be first removed or blistering may ensue. If edema and pain are intense, an incision, under general anaesthesia, may be necessary. The point of the scalpel should be inserted deep in the meatus beyond the swelling and then the cut made outwards. It must be incised down through the base of the boil or relief of pain will not result, but on the contrary it may be intensified. Boracic fomentations should follow for twenty-four hours.

Impacted wax.—A plug of wax long retained in the meatus may start a dermatitis and an exudate which causes the wax to swell, the pressure of which on the inflamed surface results in ear-ache and possibly some tenderness or pain behind the ear or side of the head. The patient complains also of increased deafness and autophony (if the hearing was previously good) with, in some cases, discomfort and pain on mastication.

If the outer end of the meatus is small and the wax plug has a hard central core, attempts at its removal by syringing are unwise before using some means of softening it for a few nights previously. In such a case the syringe jet must impinge directly on the plug and force it against the drum, which may damage the latter. Thirty grains of bicarbonate of sodium and 2 drachms of glycerine to 1 ounce of water make a good wax softener if the meatus is filled nightly with it; but if ear-ache is a feature of the case I prefer to use olive oil, carbolized to 2 or 3 per cent. This oil, used warm and dropped into the ear every four hours for one or two days, will soothe the aching and soften the wax sufficiently to permit its removal subsequently by syringing with bicarbonate of sodium solution, 2 drachms to the pint of warm water.

Exostosis.—This is a single bony outgrowth which narrows the lumen of the canal and is generally situated about half an inch inwards from the outer end. At a first glance it may be mistaken for a boil, if such is suspected, but it is solid to touch with a probe. Usually it does not cause any pain, unless it is so large as to press on the opposing meatal wall, when a dermatitis may result. If large enough to occlude the meatus, advice should be sought on the question of its removal which should not be lightly undertaken by those unfamiliar with the technique and risks attendant upon what may be considered an apparently simple surgical procedure. An exostosis may cause impaction of wax together with meatal pressure and pain, and this should be treated in the manner advised above for impacted wax.

EUSTACHIAN TUBE

An inflammatory involvement of this usually precedes that of the middle ear and the pain is localized in the region behind the angle of the jaw, in front of the anterior border of the sterno-mastoid muscle and below the lobule of the ear. It is often preceded by pain lower down in the region of the tonsil, which is felt below the angle of the lower jaw, in the anterior triangle of the neck; so that there may be a sequence of pain, first below the angle of the lower jaw, next above and behind it, and then in the depth of the meatus and even still later in the mastoid. This is the common order of involvement of the middle-ear spaces arising from an infection of the fauces and the tonsillar region, and in many cases this sequence will be recalled by the patient when the memory is put to the test. It may be regarded as spread of infection by continuity from the fauces and nasopharynx, not specifically related to epidemic colds. On the other hand, in the respiratory infections of the upper air-passages associated with the exanthemata and influenza, the symptom of pain may be first experienced in the tympanum, due to the greater incidence or effect of the inflammatory reaction here. In the efforts to keep the nasal passages clear and comfortable, the frequent or forcible use of the handkerchief may carry the infected products of inflammation into the middle-ear cavity, and the resulting reaction and engorgement soon reach the limits of their possible distribution before tension and pain become manifest.

Eustachian tube pain may be treated by the frequent inhalation of steam impregnated with tinct. benzoin. co or menthol, in addition to the methods mentioned below under the heading 'middle-ear inflammation'.

MIDDLE EAR

Acute middle-ear inflammation.—Pain is an outstanding symptom of this condition, due, in the early stages, to engorgement of the tympanic cavity lining and accompanied by an increasing deafness and moderate pyrexia. As the case progresses towards suppuration, physiological inflammatory exudates accumulate in the cavity and, as there is now no possible escape through a swollen Eustachian tube, distension takes place at the expense of the only mobile wall, the tympanic membrane, and so the pain

becomes intensified and is often exasperating. It is usually boring and throbbing in character, the throbs corresponding in rate to that of the pulse beat. A thin membrane may give way and relieve the tension quite early in the exudative stage, but a tough one may not do so for some days.

In the early stage of ear-ache, with slight deafness, pyrexia, and only redness of the membrane, expectant treatment should be carried out, as many such cases occur, which never proceed beyond this phase, but which if surgically incised must suppurate, no matter how aseptically the operation is performed. The patient should stay indoors and drop 2 per cent glycerine acid carbolic solution into the ear three times a day, kept in by a small piece of cotton-wool, over which a large pad is placed, and then lie on a hot water bottle. This relieves pain. A dose of calomel (three grains) and ten grains of aspirin on going to bed, followed next morning by a saline, may terminate the attack.

If the pain, deafness, and pyrexia increase, the case is passing into the exudative inflammatory stage and will end in suppuration. An examination of the membrane will now reveal oedema and bulging. To interpret these changes correctly under either direct or reflected light requires a considerable degree of practice and experience, owing to optical illusions of planes of surfaces and colour changes, but if they are present the immediate release of tension is indicated.

Spontaneous perforation or a simple paracentesis will answer the primary physiological needs for the relief of pain, but they are not satisfactory in permitting the free escape from the cavity of any thick inflammatory products, to enable its rapid restoration to its air-space function. To insure this, a curved incision with its concavity upwards and forwards somewhat like a very open letter U is best and should be made in the entire extent of the posterior half of the membrane. A sterile ribbon gauze dressing, lightly filling the meatus, should be inserted and left *in situ* for two days.

Chronic middle-ear suppuration.—Pain is relatively rare in chronic suppurative lesions of the middle-ear air spaces, this being especially so if the perforation or absence of drum is sufficiently large to afford free escape of discharge and release of inflammatory tension. When present it may only amount to an occasional twinge, the chief discomfort arising from deafness and discharge. Even the latter in many cases is not sufficient in quantity to escape at the external meatus, because it evaporates in the passage to accumulate as debris mixed with wax. This absence of pain is probably the reason why the patient tends to ignore the gravity of the disease and so consequently omits or neglects to have the condition persistently and properly treated. This also explains why our medical forefathers regarded the escape of discharge as harmless, so long as it was not accompanied by pain, but arrest of the discharge with the onset of pain they had learned by experience to look upon as grave symptoms, often followed by fatal consequences.

It is now known that this development was due to an intracranial extension of the disease from the primary erosion in the middle ear, which was the previous source of the discharge. The latter has now invaded the cranial cavity, setting up, usually, in the first instance an extra-dural abscess, lying between the dura mater and the bony wall of the cranium. Inflammation of the dura mater (pachymeningitis) is invariably present in such cases, so that pain becomes a very prominent symptom, in the form of a severe continuous headache, on the affected side. The site of the lesion most likely to be followed by such a sequence of events is either in the roof (attic) of the middle ear, the aditus leading to the mastoid antrum or, in the latter, with a perforation high up in the tympanic cavity.

The type of the suppurative lesion most prone to cause intracranial extension is that known as cholesteatoma, so called because cholesterol crystals are found between massed layers of epithelial cells. The continued increase of these layers is at the expense of the underlying bone, so that an invasion of the cranial cavity may ensue, by erosion of the intervening bony wall. About 33 per cent of all cases of chronic middle-ear suppuration are accompanied by this condition, which should always be suspected if the discharge has a very foetid odour.

Recurring acute exacerbation.—Attacks of acute inflammation may recur in cases of chronic suppuration, causing an exacerbation of the latter with increased aural discharge and some ear-ache. The pain is rarely severe and never as bad as in a primary acute middle-ear inflammation, because, as already pointed out, the presence of a perforation releases the tension of inflammatory swelling and discharge. The pain is usually felt in the tympanum, but may spread to the mastoid, the latter being tender to pressure, which will raise the serious problem of an acute mastoiditis. This complication arises occasionally from these exacerbations. For the tympanic pain, the use of 3 per cent glycerine acid carbolic is indicated and usually suffices to give relief.

Erosion of the attic roof and outer wall.—In my experience ulceration of bone in this situation is usually accompanied by neuralgic pains above the ear, radiating to the vertex, which cause the patient a considerable degree of discomfort at times. The pain is possibly aggravated by a periostitic patch of the inner end of the meatal roof, infected by extension from the attic erosion. The presence of the lesion is revealed by some granulation and thick pus, usually devoid of mucus, at the junction of the meatal roof and Shrapnell's membrane. The periostitis is actually outside the middle-ear air spaces, which may explain the radiating pain.

Sometimes an examination of the tympanic membrane may reveal the pulsation of pus in the perforation. If this is seen in the attic region, in a chronic case, and is accompanied by arrest of discharge from the ear, together with the sudden onset of severe unilateral headache, it raises a strong suspicion of an extra-dural abscess, the pulsation being conveyed from the dura mater to the pus in the perforation. Pulsation of pus in the perforation is also a very common occurrence in acute middle-ear suppuration, due to the inflammatory engorgement of the mucous membrane, which is also the cause of the throbbing pain. This is not to be confounded with the above. In the acute condition the pulsation appears during the calm after the storm of symptoms and is a benign indication of the usual physiological progress, but in the chronic case it appears only during the storm and is of malignant import.

A useful working rule is that an aural discharge usually diminishes or ceases with the onset of intracranial complications arising from either acute or chronic middle-ear suppuration. If the arrest be accompanied by pain and moderate pyrexia in chronic cases, a pachymeningitis and extra-dural abscess should be suspected, and if in acute cases with a high pyrexia, say 104°F. or more, a lateral sinus thrombosis is the more likely cause. High pyrexias have a tendency to diminish all secretions and discharges, even those of inflammatory origin. Either may occur without any localizing sign in the mastoid region and, as the treatment is promptly surgical, the most skilled help obtainable should be summoned immediately.

Non-suppurative diseases of the middle ear.—To this group belong middle-ear catarrh and otosclerosis, in which gradually increasing deafness is the dominant symptom and ear-ache a minor one. In both, however, there may be fleeting darts of pain at times, but these are rarely more than momentary twinges and seldom call for any special treatment. A record of its occurrence is important, as suggesting the presence of a low

grade inflammatory process, the recognition of which renders the prognosis to hearing more grave, this being especially so when arising in patients with a family history of deafness.

PERFORATIONS AND SCARRING OF MEMBRANE

Nasal obstruction, perforations and scarring of tympanic membrane.—Patients with nasal obstruction frequently have contact areas of opposing mucous membrane in the nose, which cause discomfort and excessive secretion, for the relief of which the habit of sniffing is resorted to. The frequent repetition of this respiratory act may cause excessive and sudden withdrawal of air from the tympanic cavity and produce a partial vacuum. This may cause an ear-ache of short duration in two ways: First, by a responsive engorgement of the mucous membrane lining, to meet the sudden diminished pressure of the partial vacuum created in the cavity; and secondly, for the same reason, from sudden stretching of the tympanic membrane wall of the cavity by external atmospheric pressure in the meatus. Persons with a moist catarrhal mucous membrane acquire this sniffing habit, and I have no doubt that it is a potent mechanical factor in starting air-pressure disturbances in the middle-ear space which gradually lead to deafness. Attention to the nasal condition is necessary in these cases. A warm alkaline nose wash and inhalation of menthol vapour give some relief. I have come across some cases of large open perforations of the tympanum or attic, with a dry and completely healed lining, in which slight pain was complained of, especially in cold weather or if exposed to the draught of an open window or that of a motor car. I have also heard of a process of the incus was caught up in a scarred membrane. This exposure may also cause giddiness in some of these very sensitive patients. Keeping the ear warm and protected by a piece of wool when exposed is sufficient treatment.

Mastoiditis.—This is secondary to an inflammatory infection of the middle-ear cleft, which anatomically implies the Eustachian tube, middle-ear cavity (atrium and attic), the aditus, and mastoid antrum. In extension of these we must include the mastoid air cells of the typically developed mastoid or the cancellous centre of the atypical bone. In rare cases suppuration may be manifested first in the mastoid, without any active inflammatory sign being present at the moment in the middle ear, although the primary infection of the former had travelled across the latter, but cleared up. With the primary infection of the middle-ear cleft air spaces, pain may be felt in the mastoid synchronously with that of tympanic ear-ache, but with the onset of middle-ear suppuration the mastoid pain often subsides, to develop later, if suppurative activity in the antrum or air cells should ensue.

Tenderness to pressure over the bony process may be present with the first and second manifestations of pain, but disappears during its absence. If the tenderness to pressure accompanying the early tympanic and mastoid pain is felt as low as the tip of the process, it is some evidence of a wide infection and of the bone being of the cellular type. For the same reason the development of mastoiditis is more probable than if the tenderness be restricted to a small area just over the mastoid antrum. If the tenderness to pressure accompanying the second onset of mastoid pain which follows middle-ear suppuration be felt only over the antrum region, one should suspect an atypical or non-cellular type of bone with a forward lateral sinus, because in the cellular variety of mastoid the tenderness is greatest at the tip or above this on the posterior border, where the inflamed air cells come closest to the periosteal surface. This is a point of considerable surgical importance, as the difficulty of operative technique is greatly increased by the presence of a forward lateral sinus; for to avoid wounding it in the approach to the antrum much care and skill are

required, whereas to open the antrum in the typical cellular mastoid this risk is comparatively small.

The primary pain in the region of the mastoid antrum associated with middle-ear suppuration is most likely the result of inflammatory engorgement in the aditus, just as a similar involvement of the fronto-nasal duct will cause frontal pain, with a maxillary sinus suppuration, though the frontal sinus is radiologically free from any evidence of change. This primary pain and tenderness usually subside as the middle-ear suppuration progresses and if the latter is favourable may not return, so treatment is therefore directed to the general systemic and middle-ear condition.

To relieve mastoid pain heat or cold is about equally effective though the continuous maintenance of the application is the point of greatest importance and for this purpose antiphlogistine or similar preparations are very comforting. Avoid excessive heat as it may give rise to fictitious signs of mastoiditis, such as redness and soreness. Mastoid pain and tenderness, associated with an active middle-ear suppuration, which occur some days after the onset of the latter, whether preceded by a previously observed attack of pain or not, are more grave symptoms because they set in when the exudative stage of the inflammatory process is at its height, and indicate that resolution of the inflammation in the bone has not been accomplished but that, instead, suppuration is developing. This process may now spread to the cortex of the bone, causing a periostitis with oedema of the periosteum and its covering tissues. It is now very painful and exceedingly tender even to slight pressure, but an incision down to the bone may not yet reveal any pus and even the interior of the mastoid may only show the intense engorgement of an acute osteitis. If allowed to develop further, the swelling will increase, the skin becomes red and pits easily. An incision now will reveal subperiosteal pus, with possibly an erosion on the mastoid cortex, commonly over the antrum, with frank pus in the bony interior.

This is the typical form of mastoiditis, as it occurs in children above five years of age and is far less grave than the form seen without any post-auricular swelling. The proper treatment is the mastoid operation known as Schwartz's. Below the age of five, a swelling may occur on the mastoid accompanying acute middle-ear suppuration, by extension of this process through the notch of Rivinus and not through the mastoid cortex. For this a simple Wilde's incision will usually suffice. The late onset of pain and tenderness (especially to deep pressure) with no oedema or outward sign and a continuing pyrexia, presents a far more serious problem. These are the cases which may lead to the gravest complications, as the infective process lies deep in the bone. For instance, inflammation in the group of mastoid cells lying behind the facial or Fallopian canal may give rise to a facial paralysis. This is not common, but the same seat of inflammation may cause an engorgement of the posterior labyrinth wall and set up a peri-labyrinthitis with vertigo. It also lies in very close proximity to the lateral sinus and may involve this, so that here we are confronted with a possible labyrinthitis, which may end in meningitis or lateral sinus thrombosis followed by general septicæmia or pyæmia.

REFERRED EAR-ACHE

When careful examination of the ear by anyone with the necessary experience can exclude any form of active disease or deafness, the source of the ear-ache must be sought for elsewhere. Some of the causes described below are rare, others are fairly frequent.

Teeth.—Caries of the teeth, and those of the upper jaw in particular, may cause pain in the corresponding ear. An impacted wisdom tooth is a not uncommon offender. If no other explanation is available and assuming that a dental caries is suspected, a

radiological examination may be necessary to establish or negative this suspicion.

Alveolus.—Bony inflammation, associated with dental caries, may cause ear-ache. The treatment in each case consists in dealing with the diseased focus.

Nasal accessory sinusitis.—Acute or chronic inflammation and suppuration of the maxillary or sphenoidal sinuses may cause referred ear-ache. It is possible, however, that they most commonly do so by their escaping secretions infecting the area around the Eustachian tube, a condition not easily diagnosable in many cases, owing to the difficulty of getting a proper view of the nasopharynx.

Ethmoidal region.—Sepsis in these cells may cause changes around the Eustachian tube and ear-ache. Carcinoma in this region has been known to cause pain in the ear.

Nasopharynx, pharynx, larynx, œsophagus.—Ulceration in any of these regions, whether simple inflammatory, tuberculous or carcinomatous, may excite referred pain in the ear. A knowledge of this fact may lead to the earlier examination and discovery of a growth, with the consequent better prospect of successful treatment. Post-cricoid carcinoma, a condition arising in the upper end of the œsophagus and decidedly more common in females than in males, may be responsible for referred pain to the ear at an early stage in its growth. Ear-ache, in the absence of any inflammation of the ear or deafness, should, in females over 50, attract attention to any throat symptoms present and to examination for post-cricoid carcinoma.

Fauces, tongue, tonsil.—Ulceration, or even acute inflammation in these structures, may be the underlying cause of referred ear-ache; for example, acute

tonsillitis and quinsy very commonly, and a tonsillar calculus in a tonsil may also do so. The post-operative ear-ache of tonsillectomy made worse by swallowing is frequent, though there is not any aural disease. Permanent relief of pain in all these cases depends upon the cure of the underlying condition, but temporary relief may be obtained in the acute forms by placing some warm oil and wool in the external meatus and over this a large roll of wool extending below the angle of both jaws and held in position by a bandage tied over the vertex.

Temporo-mandibular arthritis.—Pain in this situation, owing to its close proximity to the external meatus, may be regarded as ear-ache. The first step is to see that there is not a mass of hard wax present; and then to press over the joint as the patient opens or closes the mouth, which will elicit pain and tenderness. An irregular chewing bite may cause this pain; thus extraction of some diseased teeth, if a denture is not substituted, may involve additional strain to fall on one joint. Treatment consists in correcting an irregular bite. If the pain is due to a true arthritis, the application of heat by an infra-red ray lamp is very helpful.

Neuritis of the great auricular nerve.—The distribution of this pain is usually in the back of the head, neck and ear. Tender spots may be felt between the mastoid and the spine, above the parietal eminence, and between the sterno-mastoid and trapezius muscles. It may arise from riding in an open motor-car or sitting near an open house window, especially in hot weather, though some authorities regard it as due to septic absorption. It usually yields to salicylates or aspirin, but heat applied by the infra-red ray lamp is very effective.

Reviews

THE ANÆMIAS.—By Janet M. Vaughan, D.M. (Oxon.), M.R.C.P. (Lond.). With notes by Hubert M. Turnbull, D.M. (Oxon.), F.R.C.P. (Lond.). 1934. Oxford University Press, London. Pp. xii plus 248, with 24 text-figures. Price, 12s. 6d.

IN the first place we must apologize for the delay brought about by a concatenation of circumstances, some avoidable, others unavoidable, in the publication of the review of this book, which, from the point of view of the general practitioner at least, is by far the most important book on anæmia that has been published for some years.

The arrangement of the book is a particularly straightforward one. The first chapter is on the normal blood picture, in the adult male, the adult female and in the child, and on normal erythropoiesis. The normal blood picture given is not a mere copy from standard textbooks, but is composed from the more recent observations reported in the literature; the authority is usually quoted.

The next chapter is on the classification of anæmias. The classification is on an ætiological basis. The three main divisions are dys hæmopoietic, post-hæmorrhagic, and hæmolytic anæmias; the first of these is subdivided into the deficiency group, the toxic group and the unexplained group, and the deficiency group is again subdivided according to the nature of the deficiency, i.e., iron, the P. A. factor, vitamin C, or thyroxin, and so on. The classification leaves only splenic anæmia and von Jaksch's anæmia unclassified. The plan seems to be a rational one and allows for regrouping when our knowledge regarding certain of the anæmias advances, without complete disorganization of the whole scheme. There is no place in this classification for a hyperchromic anæmia of pregnancy due to vitamin-B deficiency. Perhaps the author feels that the case for such an anæmia is not sufficiently

proven; many will agree with her, but nevertheless there is a hyperchromic anæmia that is cured by marmite.

The syndromes that appear in the classification are then dealt with, *seriatim*, each on the traditional plan, under the headings—definition, clinical picture, blood picture, pathological anatomy, etc. There is a short but useful bibliography, and both an authors' and a subject index.

Hæmatology is at present in a very fluid state, it would therefore be quite impossible to please everybody, but we should say that the author's compromises will have achieved the maximum success possible in this direction. The reader in the tropics will no doubt wish that she had been a little briefer in her references to the rarer anæmias and had devoted more space to the anæmias due to hookworm disease and malaria that loom so large in medical practice in the tropics. There are a few other defects that the hypercritical reader may note; for example, there are repeated references to the platelet count but nowhere, as far as we were able to see, was there any mention of what the author considers the normal count; this is important as opinions on this point differ so widely. Then, again, there is a tendency to throw in a little liver, in the treatment of conditions in which iron would have been sufficient; this will do no harm and may even increase the rapidity of recovery as liver is very nourishing, but it increases the cost of treatment very seriously.

As Professor Turnbull has contributed a very large proportion of the book, the histological and the pathological anatomy sections, which, as far as the reviewer is concerned, form the most important part of the book, one wonders why Professor Turnbull's name does not appear on the cover; we hope that this access

of modesty or of gallantry will be overcome by the time the next edition is published.

We can very strongly recommend this book to teachers of medicine as a basis for their lectures, and as we have already implied the general practitioner will find in it a valuable guide to the treatment and accurate diagnosis of all forms of anaemia. It is an Oxford Medical Publication and its format, therefore, leaves nothing to be desired.

L. E. N.

THE PREVENTIVE ASPECTS OF MEDICINE. (A Series of lectures delivered at King's College Hospital Medical School), 1934. Published by The Lancet, Limited (7, Adam Street, Adelphi), London. Pp. vi plus 376. Price, 10s. 6d.

THE general medical council, in its instructions to teaching bodies, recommends that the preventive aspects of medicine should permeate the whole curriculum. No one will question the wisdom and desirability of this dictum, but it has been very difficult of application in actual practice. The medical student during his curriculum is so much concerned with the observation of the sick and work in the hospital wards that it is very difficult for him to get the perspective of prevention until he has finished his studies. But, nevertheless, general practice is becoming more preventive in scope. People are demanding and are being taught to demand information as to modes of healthy living which the doctor should supply. This outlook should be conveyed to the student during his medical course. During 1933-34 a series of lectures was arranged by the authorities of King's College to the medical undergraduates. The lectures were given by experts in their own subjects and they were arranged methodically to cover a large number of subjects and diseases; these lectures have now been collected into a volume. Sir George Newman opens the symposium with a discourse on the development of the preventive outlook in the medical curriculum and its practice afterwards. The subjects are arranged methodically; water supply, ventilation, maternal mortality, the infant and the school child come first. Food and dietaries are next dealt with. An appropriate opening to the prevention of infectious disease is given by an admirable survey of epidemiology and its lessons by Major Greenwood. Here also is an excellent chapter on immunity by Professor Topley. The prevention of venereal diseases, accidents, and mental disorder are next dealt with and the book finishes with an account of the public agencies existing in England for the prevention of diseases.

The lectures are good and the book should be obtained by all public-health teachers and administrators. Tropical matters are of course not dealt with. We commend the book in every way.

A. D. S.

A MANUAL OF THE PRACTICE OF MEDICINE.—By A. A. Stevens, A.M., M.D. Thirteenth Edition. 1934. W. Saunders and Company, Limited, London and Philadelphia. Pp. 685. Price, 16s.

THE fact that this book has reached the thirteenth edition in forty-three years shows that there must be a demand for it. It gives, however, only the barest outlines and its only possible use would be for students performing a rapid revision the day before an examination.

It is not recommended to students in India because, to quote one example, the treatment of kala-azar is dismissed in the following manner: 'Sodium antimony tartrate is believed to have specific curative properties. One-half c.c. of a two per cent solution may be given intravenously every two or three days up to tolerance (3 to 4 c.c.)'. This antiquated and brief statement would be of no use in answering an examination question on the subject.

PHYSICAL DIAGNOSIS.—By R. C. Cabot, M.D. Eleventh Edition. 1934. Baillière, Tindall and Cox, London. Pp. xxiv plus 540, with 509 figures. Price, 22s. 6d.

IN a period of twenty years this book has passed through ten editions and the eleventh now makes its appearance. Originally written and repeatedly revised and brought up to date by one of the most famous teachers of clinical medicine in America this volume naturally contains a great deal of valuable information.

All the recent advances in mechanical aids to diagnosis such as improvements in x-ray technique and the electrocardiograph have been included in this edition, but at the same time the author is to be congratulated in clearly maintaining the importance of personal examination of the patient by inspection, auscultation and palpation, for it is very much the tendency of modern medicine to leave the diagnosis to the laboratory specialist and to rather slur over what one looked on as the old-fashioned (and accordingly inferior) methods of methodical and painstaking clinical examination. This book is full of valuable advice in the interpretation of signs, not the least useful being the explanation of certain sources of error that may arise from lack of experience.

Numerous excellent illustrations are scattered throughout the book and careful study of these without reading the text at all will be found of great educative value. The only danger in a book of this kind, in the reviewer's opinion, is that one might tend to rely on it too much, to the exclusion of one's textbooks of medicine and so become obsessed by the importance of discovering physical signs without a proper conception of their application to special diseases. But if this is borne in mind and such a book is used as an inseparable companion to a general textbook it will be found a valuable addition to the clinician's library.

To say that the book is printed and bound in the usual style of Messrs. Baillière, Tindall and Cox is sufficient recommendation regarding its manner of production.

ALLERGY IN RELATION TO LYMPHADENOMA.—By G. P. Chandler, M.D. (Camb.), M.R.C.P. 1934. John Bale, Sons and Danielsson, Limited, London. Pp. vii plus 104. Price, 10s. 6d.

IN this monograph the author has reviewed the various theories regarding the nature and aetiology of lymphadenoma; he is inclined to believe that, although the evidence is conflicting, yet it is suggestive of the disease being of an infective nature. The histological appearances of the affected glands and certain of its clinical features point towards its being an infective process. The causative organism has not been identified, but there is some evidence to suggest that it may be a filter-passing virus. The author tried to obtain evidences of the infective process by testing the allergic reactions of the patients to specific proteins of this hypothetical micro-organism. He extracted the lymphadenomatous glands by various methods and tested the patients by intradermal injections of these extracts. No allergic reactions were obtained in any of the patients. Further, no evidence of the presence of an immune body in the sera of patients was obtained by the precipitin tests. He concludes that, if any weight is to be attached to these negative findings, they suggest that lymphadenoma is of neoplastic rather than of an inflammatory nature.

D.

A PATHOLOGY OF THE EYE.—By E. Wolff, M.B., B.S. (Lond.), F.R.C.S. (Eng.). 1934. H. K. Lewis & Co., Ltd., London. Pp. x plus 283, with 124 illustrations. Price, 28s.

THIS book has been beautifully turned out by Messrs. Lewis as regards its size, binding, printing, paper and illustrations, but on perusal it hardly

lives up to its appearance. The author has bravely undertaken to introduce a subject whose essentials 'most students and ophthalmic surgeons find difficult to come by'. This introduction is somewhat abrupt and to the reader rather suggestive of an illustrated nomenclature of diseases. Over a fifth of the illustrations are of normal anatomy from a previous work by the author. The ordinary elementary volume which appears periodically in connection with English clinical ophthalmology usually escapes a severely critical review because many critics have come to regard such publications as part of a custom. In view of the basic importance of pathology, however, an author of some experience who produces an expensive, though elementary book, can hardly expect to escape, nor would he be flattered by faint praise. In the present volume the sins of omission are many, and those of commission not a few. Some examples of these may be given.

Page 101. We find 'the vitreous is entirely inert to trauma'. This is unfortunately not true.

Page 103. Synchysis scintillans:—No mention is made of asteroid hyalitis.

Page 124. 'Retinitis pigmentosa sine pigmento is probably an early stage of retinitis pigmentosa'; surely not.

Page 167. 'Colobomata result as a rule from imperfect closure of the foetal fissure'. This is a doubtful statement, and recent views are not given.

Page 190. Glioma is 'the commonest cause of sub-acute glaucoma in children'. This is certainly not true in India.

Page 201. Syphilis of the optic nerve:—No idea of the frequency of this condition is given, the same is true of other conditions throughout the book.

Page 223. Under lymphoma of the orbit it is mentioned that 'leukæmic and pseudo-leukæmic tumours occur'. Lymphoma is one of the commonest tumours of the orbit in some countries.

Page 241. Iritis is 'not common' in diabetic eyes. Such a statement is very questionable if biomicroscopic methods are used.

Pages 259 and 260. Rodent ulcer:—There seems to be some confusion between true rodent ulcer and the common basic epithelioma of the orbital region.

There is some lack of perspective in dealing at relatively great length with some subjects, e.g., papilloedema, sarcoma of the choroid, whilst treating others with actual brevity, e.g., the sclera and glaucoma.

References in the text to the literature are scanty and the bibliography, largely German, omits many important references in English.

The Indian student will probably find the pathology in his textbook by Fuchs more satisfying, and what the specialist wants is a new edition of Parson's *Pathology of the Eye*, or a modern work arranged on as excellent a pattern, but this work will help the post-graduate student to an orderly arrangement of his ideas.

R. E. W.

SCHISTOSOMIASIS (BILHARZIASIS).—By Dr. R. Girges. 1934. John Bale, Sons and Danielsson, Ltd., London. Pp. xii plus 529. Illustrated. Price, 25s.

This book represents an enormous amount of work and it includes everything of importance that is known of human schistosome infections. The first chapter is devoted to a detailed history of the three infections, this is followed by full anatomical descriptions of the three species and their relations with animal schistosomes. The epidemiology and distribution throughout the world are fully detailed in part III, and part IV consists of a complete description as

to how to collect and study material, both adult and larval, as well as giving useful descriptions of the chief snail carriers of the infections. The diseases caused by *S. hæmatobium* and *S. mansoni* are naturally given in more detail than that caused by *S. japonicum* for the author has had to copy from other works for a description of this disease; in this he has obviously freely borrowed from the excellent account given by Faust and Meleney some years ago.

Over one hundred pages are devoted to what the author has described as the visceral type of *S. mansoni* infection. It is very largely his work that has been responsible for the recognition of this form of schistosomiasis and he has collected in this book a great deal of epidemiological, clinical, and pathological data to establish this as a disease. It is unfortunate that in the ætiology his enthusiasm has led him to state what are only probabilities as definite facts.

The reviewer gives full credit to the author for producing a book in a foreign language and such a difficult one as English at that. But he cannot help expressing regret that someone with a critical discrimination was not asked to edit it, for an otherwise fine piece of work is marred on practically every page by the author's insufficient knowledge of English. It is also considered an unjustifiable extension of the principle of naming helminthic diseases after the causal parasites to refer to *Schistosoma mansoni* infection as 'mansoniæsis'.

P. A. M.

AIDS TO THE ANALYSIS OF FOOD AND DRUGS.—

By C. G. Moor, M.A. (Cantab.), F.I.C., and W. Partridge, F.I.C. Fifth Edition. Revised by J. R. Nicholls, B.Sc. (Lond.), F.I.C. 1934. Baillière, Tindall and Cox, London. Pp. viii plus 322. Price, 5s.

THE phrase 'adulteration of foods' should nowadays be somewhat extended; the terms sophistication and fortification of foodstuffs must, in the light of recent knowledge, be introduced. The public little realize how many of their purchased foods are altered for better or for worse in order to improve their appearance, taste or saleable value. A detailed list of the various substances added to foods and drugs cannot be given in a review, but a perusal of the pages of this book is enlightening. A description of the method for estimating vitamin C shows that manufacturers advertise rather than conceal the contents and/or supplements of their wares. Many of these fortifications are indirectly the results of the increased knowledge and interest taken by the public in the newer science of nutrition. It behoves the medical profession to see that manufacturers do not exploit or misrepresent such knowledge to the public. The book is an excellent small summary of the various methods for estimating a number of food adulterants and additions.

H. E. C. W.

SURGICAL APPLIED ANATOMY.—By Sir Frederick Treves, Bart., and Revised by C. C. Choyce, C.M.G., C.B.E., B.Sc., M.D. (Edin.), F.R.C.S. Ninth Edition. 1934. Published by Cassell and Co., Ltd., London. Pp. x plus 720, with 174 figures including 66 in colour. Price, 14s.

A NEW edition of a medical classic is always welcome. Few medical books have the distinction of having successively passed through the capable hands of such eminent authors as the late Sir Frederick Treves, Sir Arthur Keith and Professor Choyce. Consequently, this book gives a presentation of facts and their application, such as is not to be found in the same collected form elsewhere. It is written in a very pleasant style, in fact it is a treatise on the living anatomy.

The book, based on regional anatomy, is subdivided into six parts, the last being devoted to the spine and the spinal cord. As to the general plan, adopted by the author, the anatomy of the region or organ is first described and then the surgical application is discussed very fully. In this way, a great deal of surgical matter and pertinent pathology have been incorporated. The notes on development and embryological anomalies are, everywhere, clear and succinct. To choose at random—the description of radiological anatomy of the cranium is excellent. The subject of lymphatic drainage of important organs, like the tongue and the breast, have been very fully dealt with. The chapter on hernia is particularly good, but it is regrettable that sufficient emphasis has not been laid on the fact that, in the vast majority of cases of the oblique indirect inguinal hernia, the sac or a peritoneal diverticulum is of congenital origin, owing to the patency or non-obliteration of the processus vaginalis. The illustrations are numerous and, though not of such artistic merit as one might wish for, are adequate and based on various authoritative contributions. One minor criticism may be offered; if the usual colour scheme of red for the arteries, blue for the veins and green for the lymphatics were adopted, the value of the illustrations would have been considerably enhanced. It is a minor defect and may be easily rectified in the next edition. It is a book, which may be regarded as indispensable and we commend it to all senior students and teachers of anatomy and surgery.

An adequate index is appended.

P. N. R.

SYNOPSIS OF SURGICAL ANATOMY.—By Alexander Lee MacGregor, M.Ch. (Edn.), F.R.C.S. (Eng.). Second Edition. 1934. John Wright & Sons Ltd., Bristol. Pp. xx plus 644. Illustrated with 639 figures. Price, 17s. 6d. net

THIS book may be acclaimed, without the least hesitation, as a masterpiece of its kind. The very fact that a new edition has been called for within such a brief period of its publication bears eloquent testimony to its worth and utility. The outline of the book is original in conception and so is its method of treatment of the subject-matter. It is subdivided into two parts, namely, the anatomy of the normal and that of the abnormal. The former consists of thirty-one chapters, dealing with all the important organs and with the different systems. A special chapter has been devoted to the anatomy of the child.

The first part is only excelled by the second half of the book, which contains sixteen chapters. The anatomy of congenital errors is considered first and it is followed by such diverse subjects as the anatomy of nerve injuries, bodily habitus, stiff joints and the sphincters. Other noteworthy chapters include the anatomical basis of clinical tests, surgery of the lymphatics and selected pathological anatomy. The difficult subject of the sympathetic nervous system has been described with a precision and lucidity which are seldom met with even in the special monographs. It is hardly possible in a brief review to do full justice to the comprehensive nature of this encyclopædian work. Important references have been mentioned, as a rule, in the footnotes.

This book is illustrated with 639 figures of unusual variety and excellence. There are only a few, like those of the hypospadias and extroversion of the bladder, which might be replaced in the next edition with better ones. The printing and get-up are excellent. An exhaustive index has been appended. We warmly endorse the verdict of Sir Harold Stiles that this book supplies a real want and will be welcomed alike by the student, the surgeon and the teacher of surgery.

P. N. R.

EXPERIMENTAL PHYSIOLOGY FOR MEDICAL STUDENTS.—By D. T. Harris, M.D., D.Sc., F.Inst.P. Second Edition. 1934. J. and A. Churchill, Limited, London. Pp. ix plus 248, with 230 illustrations and plate in colour. Price, 12s. 6d.

THERE can be no question of the importance of a good theoretical and practical course of physiology for medical students. This book is intended to supply such with special reference to human physiology. At the outset it might be said that the experiments described and the appended course are for most laboratories an ideal to be aimed at. The refined and indeed time-robbing technique demanded in certain branches of modern physiology are well known, notably in hydrogen-ion concentration work, electro-physiology, and the estimation of blood gases. To lay too great stress on such work on isolated organs would tend to narrow the student's mind and render him incapable of interpreting the organism as a whole when he comes to the bedside. Experiments capable of being carried out by and on the student himself are given—to mention one innovation in chapter XIII on the movement of water. This type of experiment and the usual ones on the cardiovascular system are essential. In general, Prof. Harris seems to have succeeded in retaining what is essential in the older methods while introducing the new. A student who has carried out most of the experiments and has a good grasp of the theoretical principles should be well trained for appraising signs and symptoms in the patient. The book is well written and the details and diagrams clearly set out. It should be strongly recommended to those desiring to build up a first-class course in physiology for medical and indeed science students.

H. E. C. W.

THE PHYSIOLOGY OF HUMAN PERSPIRATION.—By Yas Kuno. 1934. J. and A. Churchill, Limited, London. Pp. x plus 268, with 38 illustrations. Price, 12s. 6d.

THE author in this monograph has tried to explain many different problems regarding human perspiration. References have been made of numerous other writers working on the different aspects of the subject and the author, by a short discussion, has attempted to come to a definite conclusion. The book is full of interesting information and many experiments have been described which are of great practical value. An useful perspiration chamber and a portable apparatus for the measurement of perspiration have been described. The monograph will be of great help to the research workers in this subject. The bibliography at the end of the book will be found very useful.

P. D.

AIDS TO EMBRYOLOGY.—By Richard H. Hunter, M.D., M.Ch., Ph.D., M.R.I.A. Second Edition. 1934. Baillière, Tindall and Cox, London. Pp. viii plus 172, with 39 figures. Price, 3s. 6d.

THE author in this little book of 12 chapters has embodied in a nutshell the important points about the development of the different organs of the body. It has been written in an easy style and the subject-matter has been clearly put. The commoner abnormalities of development have been appropriately arranged and placed at the end of the chapters. The summaries of the development will be of great help to students for quick reference. The book has been made up to date by the incorporation of short notes on the development of the carotid sinus and of the recent ideas about the development of the face, the thyroid gland and the branchial sinuses. The diagrams are clear and descriptive. It is hoped that the book will be of great help to students in medicine preparing for their examination.

P. D.

Abstracts from Reports

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1932

VOLUME I

SECTION I

ON THE STATE OF THE PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES

Introduction

CERTAIN features of India's health problems demand urgent attention and, as far as possible, these have been commented upon frankly. Their urgency demands plain speaking, for, in the hurly-burly of the present-day world, politicians and the people they represent alike are in danger of forgetting, if they ever knew, that without health other things are as 'dust and ashes'. No apology is made for what may seem to be hyperbole; the scientifically-trained mind abhors exaggeration as nature abhors a vacuum, and if the reader on occasion should at the first glance consider certain statements unduly stressed, he must reconsider that impression in the light of the facts given in the course of this report.

The question of the organization and functions of the public health department required by the central Government of India has been mooted on many previous occasions and it seems only natural that on the eve of new constitutional reforms this subject should be uppermost in the mind of the public health adviser to the Government of India and should find a place in the preliminary paragraphs of his report. Under existing arrangements, all public health questions which come before the Government of India—and these questions are not few in spite of public health being a 'transferred' subject—are dealt with by the Public Health Commissioner alone, on whose shoulders have also been placed the administrative duties involved in the secretaryship of the Indian Research Fund Association, a body which corresponds in function to the Medical Research Council in England. The latter duties include not only administrative work but also the financial control of every item of expenditure incurred in every research enquiry conducted under the auspices of the Research Fund Association. These responsibilities, formerly carried out by an assistant director-general (sanitary) and for a time by the director of medical research, debar the Public Health Commissioner from devoting due time to the real functions of his office. Certainly drastic modification of the situation is required if the central government under the new constitution is to have a suitable public health organization, not only capable of advising on the numerous public health problems for which the new federal government will be directly responsible but capable of initiating fresh developments and of planning improvements. For the health and welfare of the peoples of India are the most important problems with which the new governments—federal and provincial—will be faced almost as soon as they are brought into being. By some that statement may be looked upon as an exaggeration; it is, on the contrary, a plain statement of fact made without any suggestion of personal or departmental aggrandisement. It is one moreover which is becoming more and more evident to those who have examined actual figures and who have the vision to realize their implications. Here are some of those figures. The population of British India according to the census of 1931 was 271,526,933; that of India as a whole 352,837,778. The rate of increase during the decennium 1921–31 was no less than 10.6 per cent which means that during these

10 years the population increased by nearly 34 millions. Various competent authorities have expressed the opinion that this rate of increase may be taken as the normal in the absence of any catastrophic occurrence like the influenza epidemic of 1918. At the time of writing, more than three years have passed since the last census and during these years the usual epidemic diseases, cholera, plague and smallpox, have all shown large decreases in incidence, whilst famine, in its death-dealing form at least, has been unknown. Since the end of February 1931, therefore, nearly 13 millions have been added to the population of India and the total must now be approximately 365 millions. On the assumption that existing conditions will continue, by 1941 when the next census is due to be taken, the population will probably be found to exceed 400 millions or nearly 50 million persons more than in 1931. Several authorities have expressed the opinion that many of the provinces of India are already overcrowded and Mr. Wattal in his recent volume 'The population problem in India' gives official figures in support. Where are those additional 50 millions of people to find bread? How are the adult survivors later on to find employment? Can improved methods of agriculture and the extension of cultivation to unused land provide the additional food supplies required? These questions are of immediate importance and will necessarily confront the Government of India within the next few years. But others are equally pressing, and, in inviting attention to those, I cannot do better than quote from a recent pronouncement made by Major-General Sir Robert McCarrison, Director of Nutritional Research in India, in his introduction to an article on 'Dietetics: Food and Race' published by Professor Kanga of Ahmedabad. He writes:

'It is apt to be forgotten that the well-being of a people depends more on proper nutrition and efficient sanitation than aught else. The proper nutrition of her people, the adjustment of the food supply to the population and of the population to the food supply, the provision of efficient sanitation in her towns and villages: these are India's needs; all else is of secondary importance'.

'My own concern has been mainly with nutrition; and my researches have led me to the conclusion that the diet of many millions of the Indian people is not such as can maintain physical efficiency and health. They are condemned, from their mothers' wombs, to a subnormal or diseased existence as certainly as is the engine of the best motor car when not provided with efficient lubrication or when supplied with an improper fuel. Intestinal disease, kidney disease, pancreatic disease, stone in the bladder, beriberi, epidemic dropsy, malnutrition, oedema, anæmias, scurvy, rickets, osteomalacia, pellagra, lathyrism, disorders of pregnancy, keratomalacia, night blindness, tetany, dental caries, and, above all, greatly increased susceptibility to infectious diseases; all these, and more, have been shown to be directly or indirectly due to faulty nutrition. Surely a matter of such moment is the concern of every person of education, influence or wealth, of every employer of labour, of every humanist'.

What can be done about it? How are additional and improved food supplies to be obtained? How is the general standard of living to be raised? Major-General Sir John Megaw, late Director-General, I.M.S., and others have written of the gloomy outlook for the future 'not only for the masses of the people who must face an intensified struggle for bare subsistence but also for the upper classes whose incomes depend on the production of a surplus of crops and other commodities'. The suggestion has been made that, in order to review the situation before India reaches disaster, a commission of experts should be appointed to examine every aspect of economic life of India, to make an accurate survey of the present position and a reliable forecast for the future. This is no place to discuss in detail the measures which are

required; these must necessarily include energetic steps for the prevention of disease and equally energetic measures for the education of the people in regard to mastery over environment. But there can be no doubt that the circumstances are such as demand the urgent attention of both central and provincial governments and a wide development of both central and provincial public health departments manned by experts capable of advising on the many difficult health problems which confront the leaders of this country. On the interpretation of these problems and on the lines of action adopted for their solution will depend the prosperity, health and welfare of many generations yet unborn.

Weather conditions.—Taking the year as a whole, rainfall over the country was within 20 per cent of the normal in all subdivisions except Mysore where there was an excess of 32 per cent. The main feature of the cold weather months was the unusually northerly course of most of the western disturbances during January resulting in scanty precipitation in the plains of N. W. India. During January and February, total rainfall was in large excess in Hyderabad and Mysore; in moderate excess in Burma; normal in Assam, in N. W. F. P. and in Madras Presidency; and in moderate or large defect elsewhere. Over the plains of India as a whole, the average rainfall of this period was in defect by 34 per cent. The unusual northerly course of the western disturbances was also responsible for mild winter conditions in N. W. India and its neighbourhood.

Famine conditions and their relief.—The test works which were in operation in Assam, Bengal, Burma and the C. P. during the previous year continued during 1932-33. Those in Assam were closed down at the end of May and cost only Rs. 11,330. In Bengal, distress continued till the end of September in the Rangpur, Bogra, Pabna and Mymensingh districts. In Burma, scarcity relief operations were in progress in 8 or 9 districts. By the middle of June conditions had improved and although it was hoped to close the works by July, conditions in the districts of Prome and Thayetmyo necessitated their continuance. Relief works were in progress in the Prome and Yamethin districts but operations since the middle of July were on a more restricted scale. In the C. P. and Berar test works were in progress from March to the end of July in parts of the Buldana, Yeotmal, Amraoti and Akola districts.

In Madras, conditions in the east of Bellary district, a tract frequently subject to drought, had been causing anxiety since November 1931, and road works under the control of the district board were started early in the year. The local government opened test works in order to determine the necessity of providing relief under the Famine Code. Gratuitous relief was at first provided for dependants of the workers, but this was discontinued in June and the works were closed at the end of September. Relief to the agriculturists of the affected area was also provided in the shape of suspension of land revenue and distribution of agricultural loans.

Hissar district in the Punjab, which has frequently been subject to visitations of famine, again suffered from scarcity of food and fodder during 1932-33 and test relief works were opened at the beginning of January 1933. Road works under the district board were also in progress. A private relief committee did useful work, mainly in the form of distributing cotton and wool for spinning in the affected villages.

LIVE BIRTHS

British India.—Live births registered during 1932 numbered 81,384 less than the figure for 1931. The highest rate was recorded in the Central Provinces and the lowest in Bengal and in Coorg.

Infant mortality.—Twenty-six per cent of the total mortality occurred during the first year of life, against

25 per cent in 1931. In England and Wales the corresponding figures for 1931 and 1932 were 9 per cent and 8 per cent respectively. Compared with 1931 the rate of 168.7 for British India was lower by 10 per mille.

Causes of infantile mortality.—Statistics of causes of infantile mortality are not yet recorded in India but there is every reason to believe that the main causes are prematurity, infantile debility, bowel disorders, convulsions, malnutrition, diarrhoea and enteritis, respiratory diseases, inanition, smallpox, fevers and marasmus.

Registration.—Bengal is the only province in which registration of births and deaths is compulsory in all urban and rural areas. In Madras Presidency, the Births and Deaths Registration Act (Act III of 1899) was further extended. In rural towns, registration still continues to be badly done, but the compilation of statistics for non-municipal areas was centralized in the office of the D. P. H. and improvement should occur. In Bihar and Orissa, registration is compulsory in all the 58 municipalities but not in rural areas; the police is the reporting agency throughout the province. In Burma, registration was in force in 32,478 villages and towns. In the Arakan Hill Tracts, Chin Hills and in some parts of Shan States, registration has to be carried out by means of tallies made of coloured sticks or notched bamboo splits, whilst illiterate registrars and poor means of communication increase the difficulties. In Assam, registration is compulsory in the towns, but not in rural areas. In the latter, *chowkiars* and *gaonbaras* carry out this work in addition to their other village duties.

[This report contains a great deal too much important matter for adequate abstraction in a single issue of the Gazette, so it is proposed to give abstracts from section two, which deals with diseases, in our next number.—EDITOR, I.M.G.]

THE ROCKEFELLER FOUNDATION: ANNUAL REPORT FOR 1933

International Health Division

From the time of its establishment in 1913 the Rockefeller Foundation has engaged in public health work. At the outset it took over the work of the Rockefeller Sanitary Commission, which had been chiefly directed toward the relief and control of hookworm disease. From hookworm disease, the Foundation research and control activities have been extended to other diseases, such as malaria and yellow fever. There has been, however, no attempt to cover in any intensive manner the entire field of public health. A selection is made and, within the spheres selected, limited and practical programmes adapted to local situations in many parts of the world are developed.

Attention to communicable diseases has led to the support of various other activities essential to the development of progressive public health programmes. A particular effort has been made to further public health education. Aid has been given toward the establishment and maintenance, at strategic world centres, of postgraduate schools of hygiene and public health of university grade. The upkeep of a supply of highly-trained workers in the public health field has been aided also by a liberal provision of fellowships. An extensive fellowship programme has been in operation since 1917.

Yellow fever

The yellow fever work in which the Rockefeller Foundation has for some years been engaged took another important step forward in 1933 by the completion, in co-operation with various governments, of an extensive survey which disclosed with a considerable degree of definiteness the areas in Africa where the disease occurs. Such a survey was one of the main

objects in establishing in Lagos, Nigeria, eight years ago, a field laboratory for the study of yellow fever.

Delimitation of endemic areas of yellow fever became possible only after much preliminary work in the field and laboratory, in the course of which the susceptibility of the *Macacus rhesus* monkey and the white mouse to yellow fever was demonstrated and a procedure known as the protection test was developed. A person who has once had yellow fever does not, so far as is known, contract the disease again. The blood of such a person furnishes him protection from yellow fever for the rest of his life; and when, under suitable conditions, the serum from his blood is injected into monkeys and mice that are susceptible to the disease, it protects them also.

For the protection test, blood serum from the person under investigation is injected, together with the yellow fever virus, into healthy mice. If the mice survive, this is evidence that the person furnishing the serum has at some time in the past had yellow fever. The death of the mice indicates that the person has not had yellow fever. Thus the test is used to study the distribution of immunity to yellow fever. Such immunity corresponds to the previous distribution of the disease during the lifetime of the individuals tested. The last appearance of yellow fever in a community can be gauged by collecting blood specimens from persons of the younger age groups.

With the discovery of the susceptibility of the *Macacus rhesus* and the mouse to the virus of yellow fever has passed the need for human volunteers for experimental purposes which existed at the time of those first great successful yellow fever studies carried out in Cuba in 1900 and 1901 by Major Walter Reed, of the United States Army, and his associates.

Epidemiology.—The extensive study of the epidemiology of yellow fever has brought to light some fundamental aspects of yellow fever previously unknown. Formerly the disease was considered above all a violent scourge of seaports. Even after Reed had incriminated the mosquito as the vector, and as late as 1920, the clinical and epidemiological picture of yellow fever accepted almost everywhere was a simple one.

The severe type of the disease was considered typical. It was thought to be an essentially urban malady, transmitted by a single *stegomyia* mosquito, *Aedes aegypti*. The key to control was believed to be the cleaning up of cities. By this method conspicuous success was obtained in banishing yellow fever from the seaports of North America, certain parts of South America, the West Indies, and the Panama Canal. But the disease did not disappear entirely, and we now know the reason why. Yellow fever may occur in the form of a mild disease native to interior populations. It has been found to be much more widespread than is indicated by reported outbreaks. It can exist for years as a rural malady and may occur even in places where the *stegomyia* mosquito is not found. This means that other mosquitoes can carry it, although the *stegomyia* is undoubtedly the main culprit. The control of yellow fever in large coastal towns is not sufficient to cause the disease to die out within a reasonable length of time in countries where it is indigenous.

Since 1931 the Foundation has, with the co-operation of many governments, been carrying on careful investigation of the distribution of yellow fever, by collecting blood specimens, at random, from healthy persons who had lived all their lives in the localities under investigation, and testing these for their power to protect mice against injections of yellow fever virus.

The areas throughout the world in which evidences of recent yellow fever have been found are much larger than would have been expected from known experiences with the disease.

Because of the somewhat startling findings, the specificity of the protection test has been questioned.

Control tests were made with human sera from countries believed to have been entirely free from yellow fever for generations. Among 423 specimens from such regions, three (0.7 per cent) gave the wrong indication. These misleading results of less than 1 per cent were doubtless due to several sources of error. To all intents and purposes, however, the testing of this large number of specimens confirmed the reliability of the results being obtained in other regions.

The results of the mouse protection tests showed that, in West Africa proper, yellow fever is more prevalent than was previously supposed. Approximately 25 per cent of all sera examined gave positive results. Practically the entire area covered by the survey was shown to be infectible. The Sahara Desert, however, forms an effective barrier against the disease on the north.

Findings confirm the opinion previously held that an endemic area of yellow fever exists in south-western Nigeria. It was not possible definitely to exclude endemicity in other parts of this colony, but meteorological conditions in northern Nigeria would seem to be unfavourable to the permanent existence of the disease.

Protection tests in various age groups in cities in the endemic area of Nigeria show that in endemic centres yellow fever is not confined to children, but that the percentage of those who have had the disease increases gradually up to old age. Some persons escape infection throughout life.

In the colonies to the south and south-east of West Africa, except in the interior of French Equatorial Africa, percentages of positive sera were much lower than those found in the colonies of West Africa proper. This is because the conditions in the former region are relatively unfavourable to the maintenance of yellow fever infection.

In French Equatorial Africa, where yellow fever had never been reported, 18.4 per cent of the blood specimens collected in thirty-seven towns along the coastal area and in the interior protected mice against yellow fever virus. The high percentages of protective sera obtained from both children and adults in the interior towns indicate that yellow fever has been widespread within recent years, as well as in the past. Apparently no barrier against the invasion of the disease toward the east exists in this region. The findings in the coastal area of this colony show that although some yellow fever has been present there in the past, almost no cases have occurred during recent years. The practically negative findings in the southern and south-eastern portions of the Belgian Congo and throughout the whole of Angola suggest that the limits of yellow fever invasion in these directions have been reached.

Vaccine.—Vaccination against yellow fever by the injection of human immune serum and living yellow fever virus fixed for mice was begun in 1931. The number of persons vaccinated in the laboratories of the Rockefeller Foundation has now reached fifty-six. This method of vaccination cannot be applied as widely as is desirable on account of the difficulty of securing the required amount of human immune serum, which, of course, must be obtained from persons who have had yellow fever or have been vaccinated against the disease.

Vaccination has been successful. Reaction, when present, has consisted of a rise in temperature about thirty-six hours after the injection of the virus, often accompanied by headache and sometimes by generalized discomfort. In order to obtain information as to the duration of immunity in vaccinated persons, sera from eleven of these were tested two years after vaccination. In every case evidence of protective power of the serum was obtained, but in most instances the titre or potency was found to be below the level reached soon after vaccination. Four persons with low titres were given intradermal injection of some of the virus preparation used in vaccination, with the

usual injection of immune serum omitted. The immune serum was unnecessary because protective antibodies were already present from the former vaccination. The titres rose rapidly after the injection, and in two instances reached their former high level. From this it appears that revaccination can be performed simply and effectively if found advisable. More time will have to elapse before a definite opinion with regard to the need for revaccination can be formulated.

So far as is known, no person vaccinated against yellow fever has contracted the disease. There have been no cases of yellow fever among the Foundation staff either in the laboratory or in the field since vaccination was begun two and a half years ago, although accidental infections had previously been frequent and seemingly unavoidable.

In experiments carried out during the year, it was found that immune serum recovered from animals, when injected into monkeys twenty-four to forty-eight hours after they had been inoculated with yellow fever virus, was capable of preventing or ameliorating the disease in a significant proportion of the monkeys. After forty-eight hours the effect was less definite. In no instance did the monkey recover if the administration of serum was delayed until his temperature had reached 104°F. This temperature is the threshold of fever and the beginning of illness in rhesus monkeys. Experiments show that there is no virtue in administering immune serum therapeutically. The serum, in other words, can be used only as a preventive and not as a cure.

Virus studies.—Filtrable viruses can be cultivated in tissue cultures outside of the body. In the absence of living cells or when tissue extracts alone were used, survival of the virus for a limited time could be obtained, but propagation under these circumstances was not possible. In the presence of dead tissue the virulence of the virus cultures disappeared.

A special study was made of two strains of mouse-adapted yellow fever virus in tissue culture, which had been cultivated through more than one hundred generations without change in pathogenicity, in a medium consisting of diluted normal monkey serum and living chicken embryo cells. Culture virus contained in this medium may be kept virulent for more than half a year if dried when in a frozen state. Virus which has entered into the living cell in the culture medium is not acted upon by immune serum. Virus in dead cells is destroyed under these conditions.

Investigations were made to discover whether the sera of baby monkeys born of mothers immune to yellow fever would display any protective properties against the disease. It was found that the sera of five monkeys less than six months old, born of such mothers, did display protective properties. Sera of two of these monkeys, when tested three months later, showed no protective power. It is not determined whether the protective properties of the sera of the baby monkeys were derived from the mother through the placenta or by way of the maternal milk. There is a possibility that in very young children there may be present a temporary immunity to yellow fever transmitted from the mother.

Since the virus of yellow fever is filtrable, it would be interesting to know just how small or how large the particles are that pass through the filters. During 1933 some preliminary work was done on this problem.

Studies of mosquitoes.—Two experiments are reported in which virus was transmitted to rhesus monkeys by the bites of *Culex fatigans*. In one experiment the extrinsic incubation period was seventeen days; in the other it was twenty to twenty-three days. In one lot of mosquitoes survival of the virus was demonstrated as late as thirty-nine days after the meal on infective blood. The evidence indicates that a great many mosquitoes in the experimental lots were able to free themselves of the virus. It is concluded

that *Culex fatigans* is not an efficient host of yellow fever virus.

Malaria work

During 1933 the states of the United States receiving aid were Florida, Georgia and Mississippi. The foreign countries in which assistance was given were Jamaica, Puerto Rico, Costa Rica, Nicaragua, Panama, Colombia, Venezuela, Albania, Bulgaria, Germany, Greece, Italy, the Netherlands, Portugal, Spain, India, and the Philippine Islands.

As a rule a country or state is not aided in dealing with its complete malaria problem. In the case of such a widespread disease as malaria, the problem of successful control, especially in the tropics, is one that requires years of gradual effort by the people and the governments themselves.

At Durres, in Albania, a distinct success was achieved in the control of the malaria vector (*Anopheles maculipennis chutus*) by the salinification of a lagoon in which it bred in large numbers. This mosquito is of a type that does not breed in salt water, and by rendering its favourite breeding place salty, the problem of its control was solved. Such an expedient happened to be possible in this particular area and is an illustration of the strictly local and sometimes unique measures that may be employed in malaria prevention.

An occurrence at Mysore City, in India, illustrates the dangers that sometimes attend irrigation projects. After the completion of a new dam there in connection with the installation of a hydro-electric plant, malaria began to spread. In the area concerned there were a thousand deaths from this disease. Here we have an example of man-made malaria, usually controlled with comparative ease, but illustrative of the principle that in drainage projects the possibility of furthering instead of hindering mosquito breeding must be taken into account. In Bangalore, the chief city of the state of Mysore, the malaria carrier, *A. stephensi*, has been controlled at low cost by the use of the small top-feeding minnow known as *Gambusia*.

The problem of tropical malaria is well illustrated by the work in the Philippines. At the Stotsenburg Army Reservation Camp, where malaria has defied all efforts since 1903, it is finally coming under control through army work based on studies, made in association with the Foundation, of the breeding habits of the mosquito (*Anopheles funestus-minimus*, subgroup of King) chiefly responsible for the transmission of the disease. It has been found that this mosquito is one that breeds almost entirely in streams. Accordingly, a Paris green distributor motivated by the water current has been devised. By dropping the larvicidal mixture from a mechanical device on to the surface of the stream, so that it is spread by the stream itself, the cost of malaria control has been considerably reduced. Well-planned drainage measures are also employed. For the Philippines as a whole, emphasis is placed on the use of bed nets. Tropical houses are not always of sufficiently strong and exact construction to make screening effective, but bed nets can be used with great success. The problem was studied and specific recommendations were made regarding material for these nets, their size, and the method of using them.

Mosquito studies and surveys.—A study was made of the flight range of the *funestus-minimus* subgroup of anophelines in the Philippines. Stained mosquitoes were liberated and recovered at distances varying from 1 kilometre to 1½ kilometres from the point of liberation. It is concluded that these anophelines fly a distance of at least 1 kilometre.

A new type of trap for catching adult mosquitoes was developed in the Philippines. It consists of an earth-lined box imitating the natural daytime resting places favoured by the chief local vectors of malaria.

A study was made of the possible value of an animal

barrier in malaria control in the Philippines. There is strong presumptive information that mosquitoes which had first taken blood from an infected human being were attracted to carabaos for a subsequent feeding at a time when they were potentially dangerous to man. This might indicate the possible usefulness of an animal barrier. It is concluded, however, that when these animal barriers are uncontrolled, they are of little use.

Malaria surveys.—Although malaria has been known to exist in various parts of Mysore State, India, for a long time, no extensive study of the disease was undertaken up to 1927. In that year a rapid survey was made to determine the amount of spleen enlargement in children. Following this survey it was decided to select three representative areas for more intensive study. In these areas an effort was made first to discover the seasonal variation of malaria. Then many other aspects of the malaria problem were studied *seriatim*, and the results were published in a number of papers.

A survey of anophelines revealed twenty-two species, of which thirteen had been previously recorded. Many thousands of these anophelines were dissected. Infection was reported in *A. culicifacies* and *A. stephensi*. A study was made of the relative frequency of the occurrence of the parasites of benign tertian, malignant tertian, and quartan malaria. Spleen and parasite relationships were carefully gone into, especially so far as age groups are concerned. These studies comprise the subject-matter of the first three papers.

A fourth paper deals with experimental control of malaria with Paris green. A fifth describes the control of anopheline breeding in Bangalore City, and goes further into the matter of malaria prevention by means of Paris green, which successfully controls *A. culicifacies* breeding. *A. stephensi*, which breeds in wells, was combated by stocking these wells with small fish. All the wells of Bangalore City were thus treated. The costs were kept low, well under 1 per cent of the normal receipts of the municipality.

In a sixth study, hemoglobin estimates made in the three research stations before control work began are discussed, with reference to sex and age. A seventh paper gives more detailed information on the anopheline transmitters of malaria. *A. culicifacies* and *A. fluviatilis* are apparently the most important malaria vectors of the rural areas of Mysore, and *A. stephensi* and *A. varuna* are the minor carriers.

Experimental studies

Nine 'howler' monkeys were successfully inoculated with parasites from man, and one through subinoculation from another monkey. The longest infection lasted eight days. It is suggested that *P. falciparum* may be so poorly adapted to this abnormal host that it is largely self-limited and requires little resistance on the part of the host. *P. falciparum* can be overcome and eliminated by natural processes much more easily than *P. brasilianum*, the common parasite of the monkey. However, it should be noted that the reaction of the monkey to a large number of trophozoites injected intravenously does not completely answer the question of susceptibility. The susceptibility of monkeys to human malaria is of epidemiological importance; and from this epidemiological standpoint, not blood inoculation, but the use of anophelines infected with human malaria is the critical test.

Hookworm disease

A study was made of the racial and age group incidence of the common intestinal helminths among Malays, Chinese, and Indians in the Straits Settlements. The study was based on data obtained during a survey made between 1925 and 1928, comprising 27,000 examinations. The incidence rates for hookworms, roundworms and whipworms were higher in Malays than in Chinese or Indians. Chinese have the lowest incidence rates in all age groups for hookworms

and roundworms, but the incidence of whipworms tends to be significantly higher in the Chinese than in the Indians. Hookworm infection among the three races tends to become greater in the older age groups. Roundworm and whipworm infections tend at first to rise and then to fall as the age increases, regardless of race. Conditions at the present time are possibly very different from those prevailing when the survey was made, because of the thousands of sanitary latrines installed since then.

On the basis of data obtained by experimental infection of dogs with the common dog hookworm, *Ancylostoma caninum*, a special study was made of the nature and cause of hookworm anaemia. It was concluded that it is not necessary to postulate a toxin to account for the anaemia of hookworm. The anaemia is of the type which is clinically associated with chronic hæmorrhage. It responds well to iron therapy.

The anthelmintic properties of certain alkyl phenols were investigated. In the search for a safe and effective human ascaricide, some 500 substances were tested. Hexylresorcinol was found to have as great activity as any. It is a safe and effective remedy for ascariis, and it is also relatively effective against hookworm disease. There were no cases of intoxication from this drug when it was properly administered, but there were reports of local irritation at the mouth caused by hexylresorcinol pills. Attempts were made to overcome the irritant properties of the drug. Ordinary methods failed, and a study was therefore made of several series of related compounds, alkyl phenols. None of these were as effective as hexylresorcinol however, and it appears doubtful whether a drug will be found in this series of compounds which will be as active as hexylresorcinol and yet have no local irritant action. For uncomplicated hookworm disease tetrachlorethylene is, according to present knowledge, the best drug available.

A group infestation of seven cases of acute hookworm disease occurring in Puerto Rico was reported. The infection was contracted during sea bathing in water highly polluted from a rain-swollen overflowing stream. There was sudden onset of symptoms, which included initial dermatitis followed by marked throat discomfort in the form of a sensation of obstruction. Within two to four weeks a sharp diarrhoea with colic appeared. All the patients complained of an unusual degree of weakness; all were pale and lost weight rather rapidly.

A larval phase of hookworm disease is described which is characterized by loss of strength and weight, anaemia, irregular fever, a definitely high eosinophilia and leucocytosis, possibly diarrhoea, and a light intestinal worm burden, indicating that only a small percentage of larvae had been able to reach the intestines, the rest remaining as a wandering or arrested group in the tissues. There may be no worms at all in the intestine, no ova from which to make a diagnosis, and only the blood and the history of the case to suggest a larval invasion and a frustrated uncinariasis. No adequate remedy has as yet been found for this larval stage of the disease.

This is by no means a complete list of the diseases and public health problems studied by the International Health Division but those abstracted above are the most important from the Indian standpoint and we regret that lack of space precludes even the briefest mention of the many other important branches now financed by this remarkable Foundation.

A MALARIA SURVEY OF AJMER, 1933-34. BY S. D. AHUJA, M.B., B.S. (PUNJAB), L.R.C.P. (LOND.), M.R.C.S. (ENG.), D.P.H. (LOND.), D.T.M. (LPOOL), MALARIA OFFICER, MUNICIPAL COMMITTEE, AJMER

This is an account of an enormous output of sanitary work carried out, apparently by the author, single-handed.

Data were collected on the spleen and parasite indices of the children, the mosquito breeding places scheduled, larvæ collected monthly, and adult mosquitoes caught and dissected.

The breeding places were dealt with on approved principles and a chart shows corresponding good results to the fever death rate.

In conclusion we quote the author's opinion on legislation in advance of public opinion:—'It is a sound rule not to have a recourse to law until all other means have been exhausted. Co-operation and not coercion is required'.

ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER OF THE CITY OF BOMBAY FOR THE YEAR 1933. BY J. S. NERURKER, B.Sc., L.M. & S., D.P.H., EXECUTIVE HEALTH OFFICER

THIS is a valuable report full of detailed information for which the reader is referred to the original.

The year began with a very severe epidemic of smallpox which lasted till the 3rd of June 1933. This epidemic is partly responsible for raising the death rate that was going down steadily in the last four successive years. The health conditions otherwise were very good. The number of live births registered during the year was more by 3,752 than the number of deaths that took place in the city. This excess of births over deaths was equivalent to 3.2 per 1,000 of population calculated on the census of 1931 and was recorded in succession for the third time. Before 1931 there had been no such excess since 1866, the year in which birth records were instituted.

The number of live births registered was 30,926 being 2,032 more than in 1932, 7,474 more than the average of the last ten years (1923—1932) and the highest on record since 1866. The birth rate calculated on the census population of 1931 was 266 births per 1,000.

The total number of deaths from all causes was 27,174 being 4,318 more than in 1932, 1,298 more than the average for the last five years (1928—1932) and 2,596 less than that of the preceding decennium (1923—1932). The death rate or the number of deaths in the year per 1,000 of the census population of 1931 was 23.4, as against 19.7 in 1932 and 23.8 the rate recorded for the decennium 1923—1932.

Plague was reported as the cause of 48 deaths during the year as against 37 in 1932 and 255 the average of the last ten years (1923—1932). Smallpox caused 2,659 deaths as against 313 in 1932 and 737 the average for the last decennium (1923—1932). Cholera was registered as the cause of 17 deaths being 10 more than in 1932 and 32 less than the average for the ten years (1923—1932). Influenza was prevalent in a mild form in the city during the year and caused 76 deaths as against 76 in the preceding year and 105 the average for the last decennium (1923—1932). The deaths from diseases of the respiratory system numbered 9,102 being 820 more than in 1932 and 1,859 less than the average of the last ten years (1923—1932). Tuberculosis accounted for 1,594 deaths as against 1,389 in 1932 and 1,553 the average for the preceding decennium (1923—1932). Seventy-one deaths were due to malaria, being 5 less than in 1932 and 267 less than the average of the last decennium (1923—1932). There were 1,192 deaths from ague and remittent fever as against 1,217 in 1932. The average number of deaths for the last ten years (1923—1932) from malaria was 338 and from ague and remittent fever 1,847.

The deaths among infants under one year of age numbered 8,320 against 6,298 in 1932 and 7,595 the average for the last ten years (1923—1932). The rate of infant deaths per 1,000 births registered was 269.

Compared with the decennial averages (1923—1932) the total number of deaths shows a decrease of 2,596,

the principal decreases in the mortality being 207 under plague, 267 under malarin, 655 under ague and remittent fever, 897 under diarrhoea, enteritis and dysentery and 1,859 under diseases of the respiratory system. There was also a similar decrease of 32 deaths under cholera, 37 under measles and 29 under influenza. On the other hand, there was an increase of 80 deaths under enteric fever, 1,922 under smallpox and 41 under tuberculosis.

Correspondence

GRANULOMA VENEREUM

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Will you kindly publish the following as a contribution to the controversy regarding the venereal origin of granuloma venereum.

In the venereal department of the General Hospital, Madras, we have examined and treated 230 males and 138 females suffering from granuloma venereum during the past five years (1930 to 1934). These cases were drawn from all over the province including the Northern Circars. These 368 cases, in my opinion, constitute the largest number seen in a single clinic and hence we can lay claim to have some clinical experience of this distressing malady. The table shows the total number of patients seen in this clinic each year with the number and percentage of granuloma cases.

An examination of this table reveals, among other things, an absolute larger number of males than females suffering from the disease, but, when taken in relation to the total number of cases who attended the clinic, the females show a relative preponderance. This relative preponderance of female patients is much more striking in the first three years and becomes less marked in 1933 and 1934, though the total number of females who attended the department has shown a progressive increase from 1930 to 1934.

TABLE

Year	MALES			FEMALES		
	Total patients	Cases of granuloma venereum	Percentage	Total patients	Cases of granuloma venereum	Percentage
1930	5,663	53	0.9	942	58	6.2
1931	5,507	48	0.9	868	22	2.5
1932	5,637	57	1.0	1,105	31	2.8
1933	5,579	38	0.7	1,078	17	1.6
1934	5,489	34	0.6	1,219	10	0.8

It is a clinical fact that lymphogranulomatosis of the vulva, perineum, etc., has such a close similarity to the lesions of granuloma venereum in the same situation that the former can be differentiated only with Frei's intradermal diagnostic test. We have been using Frei's test systematically in the diagnosis of vulvar and anal ulceration only from 1933 onwards. Hence the marked relative preponderance of female patients in the years 1930 to 1932 is due to the fact that a large number suffering from lymphogranulomatous ulceration must have been included in the venereal-granuloma group. With more accurate diagnosis and by excluding other venereal conditions affecting the genitalia of women (besides

lymphogranuloma of the vulva we have seen a few cases of extensive syphilitic ulceration of the vulva, perineum and peri-anal region in women which are clinically indistinguishable from venereal granuloma, short of the serological reaction and therapeutic test), it will be seen that the difference in the sex incidence is not so striking as to warrant an opinion against the venereal hypothesis. Further, the analogy of other venereal cases attending a clinic showing a preponderance of males over females is not always true, as can be inferred from the table below showing the incidence of syphilis for four years (1930 to 1933) in our clinic in Madras.

SYPHILIS CASES, PERCENTAGES

		Males	Females
1930	..	28	31
1931	..	27	33
1932	..	31.5	39
1933	..	33	47

In over 95 per cent of our male patients with granuloma venereum, there was a definite history of sexual exposure and the development of a penile sore preceding, by a variable period, the onset of typical granuloma venereum. In many instances the original lesion had healed without any treatment or the patient had undergone an operation for circumcision for the non-healing of the sore. In some cases the penile lesions slowly became a spreading granuloma. We have seen three such primary lesions which disappeared under antimony treatment and broke down a few months after. Such an invariable history of sex contact and the development of a penile lesion cannot be a coincidence but must bear an aetiological significance. In the case of women, for obvious reasons, such a history is not obtained or obtainable.

As regards the incidence of granuloma as between married women and prostitutes, our statistics tell an absolutely different tale from that of Drs. Nair and Pandalai. There is a great preponderance of prostitutes over married women, with 63 per cent of the former against 29.6 per cent of the latter. In 7.4 per cent of the cases, the exact social status of the women could not be correctly ascertained. It should be remembered that the disease is more persistent, painful and disabling in women than in men. In the case of our married female patients suffering from the disease a history of the husband having suffered from venereal sores could be obtained in a majority of cases, but only in one case could we get the husband for examination. He gave a history of a penile sore a few months before the appearance of a typical granuloma in his newly-wed wife. The husband showed a small partly-healed granulomatous sore on the inner aspect of the prepuce. Tests for other venereal diseases were negative.

The invariable association of secondary extra-genital lesions, lips, mouth, palate, etc., with either active genital lesions or scars of past disease is a strong point in favour of the venereal origin of the disease. We have examined 15 cases of extra-genital granulomas and in 13 of them they were associated with and secondary to genital lesions. We had two cases of peri-anal granuloma without genital lesions in boys of 14 and 16 who were professional passive agents in sodomy and in whom the tests for other venereal diseases were negative. This is certainly a venereal origin of the disease. The analogy of filariasis cannot be used as an argument to show that a genital situation is not necessarily venereal. Filariasis of extra-genital regions of the body is as, or even more, frequently seen as that of the external genitals. The comparative rarity of purely primary extra-genital granulomas and the preponderating frequency of genital lesions should certainly be a convincing argument for the majority point of view. The fact that a few

cases of venereal granulomas were observed in children or sexually inactive persons proves nothing except that extra-genital infection is possible, as it is in the case of syphilis.

The question of trauma as a factor in this condition needs proper study. In our series the trauma took the form of surgical operations for circumcision, buboes, etc. But in all the cases there was a pre-existing venereal lesion for which the operation was performed. In no case did an operation on a normal prepuce result in the development of a granuloma, so that trauma *per se* does not seem an important factor except that it probably helped to spread or activate the disease, and has the same aetiological value as trauma in syphilis.

It is well known that the disease has a predilection for stratified epithelium which accounts for the absence of involvement of the urethra, bladder and internal genitalia. That the vagina proper and the vaginal aspect of the cervix, though lined by stratified epithelium, are not affected in this disease, may require further investigation or may signify some innate resistance. The adult vagina is resistant to gonococcal infection though the cervical canal may be teeming with gonococci and the fornices may be bathed in purulent highly infectious secretions.

It is our opinion, though largely speculative and impressionistic, that there is a primary lesion of venereal granuloma. The primary lesion is more often recognizable in the male than the female as it is more obvious to the former and brings him to the doctor. The typical spreading, scarring granuloma seems a tertiary manifestation of the infection and does not appear to be contagious to others. Clinical manifestations of granuloma are more devastating and disabling in women than in men. It is quite likely that a larger number of men escape with the primary lesion. The greater moisture, dirt and trauma, to which the female genitalia is liable, may also account for the alleged greater frequency of the condition. If one takes into consideration genital lesions of other venereal diseases, *e.g.*, syphilis and lymphogranulomatosis, in the two sexes, one finds a contrast in the situation, extent and magnitude of the lesions. The multiple, giant, hypertrophied, condylomatous syphilides which are often found in the genitalia of women are not seen in the corresponding regions of the male genitals with such frequency. The chronic, indolent, elephantoid granulomatous ulceration of the vulva, which is frequently observed as part of the syndrome of lymphogranulomatosis in women, has no counterpart in the disease in men. Such being the case we should not be surprised if a similar contrast is observed in the case of granuloma venereum.

To sum up, a history of sexual exposure, the antecedent appearance of a primary penile lesion in the vast majority of males suffering from granuloma, the preponderating incidence in the genital region, and the few cases of purely extra-genital lesions in whom unnatural sexual practices could be proved do warrant the assumption of a venereal origin of the disease if they warrant anything at all. In the discussion of a disease from a clinical and scientific point of view, moral and social considerations are beside the point and it is a pity that the term 'venereal' has come to be associated with them through centuries of usage. As medical men, in discussing venereal disease we may recall to our mind what Stokes says in writing about the epidemiology of syphilis that 'it is not a divine moral purpose nor a satanic punitive ingenuity that connects syphilis with genital activities, but a mere biological accident, no more significant in the last analysis than the fact that potatoes grow in a sandy loam'.—Yours, etc.,

R. V. RAJAM, M.B., M.S. (Mad.), M.R.C.P. (E.),
Venereal Specialist.

GENERAL HOSPITAL, MADRAS,
19th January, 1935.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL W. C. SPACKMAN, on return from leave, on the 17th January, 1935, is appointed to be Professor of Midwifery and Gynaecology, Grant Medical College, and Superintendent, Bai Motlibai and Petit Hospitals, Bombay, *vice* Captain H. S. Waters, transferred.

The services of Major C. M. Nicol are placed temporarily at the disposal of the Government of the Punjab for employment as Assistant Director of Public Health, with effect from the date on which he assumes charge of his duties.

Major A. Y. Dabholkar, M.C., is confirmed in the appointment of Director of Public Health for the Government of Bombay.

Captain H. S. Waters, on relief, to be on general duty at the St. George's Hospital, Bombay, pending further orders.

The services of Captain P. L. O'Neill are placed temporarily at the disposal of the Government of Bihar and Orissa, with effect from the 10th November, 1934.

The services of Captain G. R. M. Apsey and Captain W. McAdam are placed temporarily at the disposal of the Government of Burma, with effect from the 7th November and the 12th November, 1934, respectively.

The services of Captain Sangham Lal and Captain J. S. McMillan are placed temporarily at the disposal of the Government of Madras, with effect from the 14th November and 15th November, 1934, respectively.

The services of Captain R. A. Wesson are placed temporarily at the disposal of the Government of the United Provinces, with effect from the 16th November, 1934.

LEAVE

Lieutenant-Colonel W. J. Simpson, an Agency Surgeon, is granted leave, preparatory to retirement, for 6 months and 14 days, with effect from the afternoon of the 12th November, 1934.

Previous notification is hereby cancelled.

Major J. S. Galvin, Civil Surgeon, Sholapur, has been granted by the High Commissioner for India extension of leave for one month and 26 days in continuation of the leave granted to him in the previous notification.

Major A. Y. Dabholkar, M.C., Director of Public Health for the Government of Bombay, is granted leave for eight months out of India, from 1st April, 1935, or subsequent date of relief.

Captain G. B. W. Fisher, Civil Surgeon, Rajshahi, is granted leave for three months and in continuation furlough in or out of India for one month and five days, with effect from the 7th November, 1934.

This cancels previous notification.

PROMOTIONS

To be Lieutenant-Colonels

- R. H. Malone. Dated 6th November, 1934.
- V. N. Agate. Dated 11th November, 1934.
- J. P. Canteenwalla. Dated 15th November, 1934.
- L. S. Modi. Dated 15th November, 1934.
- H. A. Khin. Dated 19th November, 1934.
- M. S. Joshi. Dated 23rd November, 1934.
- K. B. Gharucha. Dated 26th November, 1934.
- H. S. Anand. Dated 26th November, 1934.
- B. H. Kamakaka, M.C. Dated 29th November, 1934.

To be Captain

deLisle Carey, 24th October, 1934, with seniority Lieutenant 15th March, 1926, and as Captain 15th March, 1929.

RETIREMENT

Lieutenant-Colonel J. Morison, C.I.E., retires, 6th November, 1934.

Notes

'TABLOID' FINE-GRAIN DEVELOPER

A DEVELOPER specially intended for the production of fine-grain negatives has been introduced by Burroughs Wellcome and Company. It is known as 'Tabloid' Fine-Grain Developer and may be used for miniature or other films or plates which it is desired to enlarge to a considerable degree.

This is a developer possessing distinct and original features of its own. Its use does not demand increased exposure nor increased development and it gives negatives free from fault or chemical blemish even when used with the fastest of fine-grain films. It is prepared from ingredients of exceptional purity, a point of great importance in miniature negative work.

Dissolved in plain water, it is a most satisfactory fine-grain developer for negatives designed to be enlarged up to about 10 diameters (V. P. K. to 20 × 15 approx.), and has this further advantage, that if a 20 per cent solution of anhydrous sodium sulphite is used, instead of part of the water, the grain is still finer and permits of much greater degrees of enlargement.

A time-table is given of correct times for developing different films at different temperatures. Factors for factorial development are also given on the cartons so that development to the correct degree of contrast is rendered delightfully simple.

'Tabloid' Fine-Grain Developer is issued in cartons each containing materials sufficient for preparing 30 ounces of normal strength developer, or 60 ounces of tank developer.

STAINING SLABS

By F. R. W. K. ALLEN, M.A., M.B. (Dub.)

MAJOR, I.M.S.

I WOULD request you to draw the attention of all medical men who have a large number of blood films to examine for malarial parasites to Butler's staining slabs in case some do not know of them.

By the use of one slab, twelve thick blood films can be beautifully and simultaneously stained.

These slabs consist of a trough $\frac{1}{4}$ th inch deep by 1 inch wide cut in a glass plate $\frac{1}{4}$ th inch thick by 2 inches wide by 12 inches long. They were invented by one of the Directors of Medical Services in East Africa.

The blood films are inverted and some form of Romanowsky stain run into the trough. Here we use Leishman's alcoholic solution, diluted equal parts with water, but in East Africa Giemsa's stain is the most popular. It is not necessary to dehaemoglobinize the films before staining. After staining for 7 to 10 minutes distilled water is simply run into the trough for sufficient time to wash away all traces of the stain from the glass. The twelve slides are then dried and examined.

Our slabs were obtained from Messrs. Allen & Hanburys, Limited, London.

OVARIAL AND LUTEAL

THE glandular preparation, ovarian, has been introduced by the National Opothérapie Institute, Pisa, and is said to contain the active principles of corpora lutea and the hormones of the ovaries. It is prepared in two forms, one for oral administration and one for the now-popular intramuscular injection. Whilst one must deplore irrational polyglandular therapy, it has to be admitted that the intelligent use of glandular extracts have proved very valuable in the treatment of many conditions which hitherto proved very resistant to any form of treatment. It is claimed for this particular extract that it is of value in a large variety of menstrual disorders at all ages, at the menopause, to obviate the nervous and psychic conditions that often occur at this time, and in general neurasthenia and in the psychoses of pelvic origin.

Luteal, another preparation from the same institute, contains only extract of corpus luteum; this is mainly recommended for use at puberty and during pregnancy. It is administered by intramuscular injection.

A NEW CLAMP FOR STOMACH OR INTESTINE

By T. H. SOMERVELL, M.A., F.R.C.S.

ARTER over twelve years of continual gastric surgery in South India, I have at last managed to get the perfect stomach clamp.

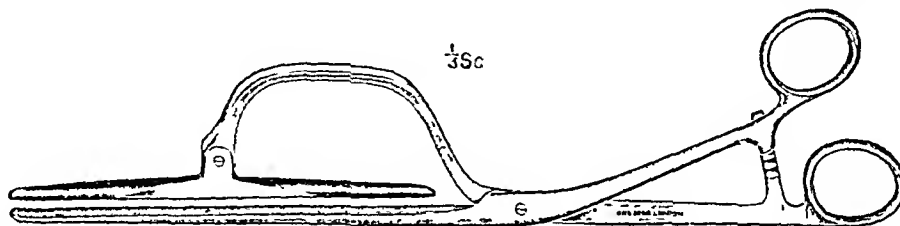
All types of the ordinary shape, whether with thick or thin blades, have a tendency to damage the stomach (or intestine) in some places, while insufficiently gripping in others; and Wells overcame this difficulty by making a hinge in the middle of one of the blades, the blade itself being attached to the hinge by springs. But the Wells' clamp is difficult to clean, and has to

egg and cheese dishes, fish, meat and savoury dishes. For invalids and for vegetarians and for those for whom a restricted diet is prescribed, it is particularly useful.

For infants marmite may be included in the ordinary feeds, and for older children it may be spread on rusks or served as broth. With children, as with adults, spread on bread and butter, or on buttered toast it is very popular.

Physicians who prescribe raw liver in the treatment of pernicious anæmia often advise that marmite should be mixed with it, as this serves the double purpose of disguising to a certain extent the disagreeable flavour of the liver while enhancing its therapeutic effect. Patients report that this mixture is infinitely preferable to the raw liver.

It is well known that the administration of sufficient active material is of the utmost importance in the



be made, in part at least, of ordinary steel, the plating of which wears away.

I have, therefore, designed a simpler clamp on the same principle, but embodying the spring in the arm between the hinge and the pivoted blade.

Messrs. Down Bros. have made two of these clamps for me, and I have tested them thoroughly during 1934 in a large number of operations on the stomach, as well as on the intestines. I can bear witness to the excellence of the clamps both in their performance and in their makers' workmanship.

The clamp holds the gut firmly, yet gently and with uniform pressure. It can be made of stainless steel throughout and is easy to clean. The pivoted blade should be enclosed in rubber tubing, and if that is done this clamp causes the minimum of damage to the mucosa of stomach or intestine. It is 'easier to be gentle' with this clamp than with Wells', Kocher's, Beck's, or any other type of clamp that I have seen.

The bent handles enable two clamps to be used side by side without undue pulling of the gut, besides allowing them to be removed independently with ease.

ON PRESCRIBING MARMITE

THE value of marmite in anæmias and certain other deficiency diseases is now definitely established. The most suitable method of administering it will vary according to circumstances. The following are some methods suggested by the manufacturers.

METHODS OF ADMINISTERING MARMITE

It may be just served as clear soup, prepared by stirring a small teaspoonful of the extract into a cup of hot water. This may be varied by the addition of a well-beaten egg, or, when allowed, one or two teaspoonfuls of sherry. Marmite made with hot milk instead of water provides a particularly nourishing and pleasant beverage, or of course it may be added to soups of all descriptions, thick and clear.

Feed marmite made in the same manner as other iced drinks is often appreciated, especially by invalids, during warm weather.

Made into a paste with about three times the quantity of butter, it forms an appetizing sandwich filling. This mixture may be spread on bread, toast, rusks or biscuits.

As a culinary adjunct, it may be incorporated in a variety of other dishes—sauces, stews, pies, gravies,

treatment of pernicious anæmia, and that recorded failures with liver therapy have been shown to be due usually to inadequate dosage, to inactive material or to septic foci.

The daily dose advised is half to four drachms according to the circumstance.

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Original Articles

DRUG ADDICTION IN INDIA AND ITS TREATMENT

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.)

LIEUTENANT-COLONEL, I.M.S.

Professor of Pharmacology

(Drug Addiction Inquiry, Indian Research Fund Association Series No 21)

Introduction

ALTHOUGH in India drug addiction has existed on a more extensive scale than in any other country in the world with the exception perhaps of China little is known regarding the problem. Two commissions were appointed to go into the matter at the end of the last century; a Royal Commission was appointed in 1893 to enquire into the prevalence of the opium habit, and a commission to go into the question of hemp drugs was appointed by the Government of India in 1895. Both these commissions collected important information regarding the prevalence and effects of these drug habits in a general way, but unfortunately the medical and scientific aspects of these addictions were not inquired into fully at that time. Nearly forty years have elapsed since these commissions did their work. Considerable changes have occurred and new drug habits have come into being, yet a perusal of the literature shows that very little work has been done on this important subject. The information available even with regard to the present-day incidence of the drug addictions is meagre. The temperance and anti-opium societies have published some data, but these are biased, and often inaccurate and misleading. Even such an important subject as infantile administration of opium, which is still so prevalent, is doing an enormous amount of harm, and is probably a cause of the high infantile mortality in some communities, has not been systematically investigated. Opium eating is very prevalent in many parts and opium smoking is indulged in freely in Assam and other areas. The hemp drugs are used to an enormous extent. No systematic work has been done to determine the ill-effects produced by these drug habits. Some years ago the Indian Research Fund Association gave the writer a small grant to investigate the drug addiction in this country and some interesting data have been collected. A list of papers published in this connection is given at the end of this memorandum. It is obvious that the inquiry has only touched the fringes of this vast problem. The wide experience the writer has of the problem as it exists in different parts of India leads him to the conclusion that the subject is of vital importance—from the social,

economic and health points of view. In this paper it is proposed to give a brief review of the work done by this inquiry.

The problem of drug addiction in India presents many features which are widely different from those met with in western countries and about which a great deal of misapprehension exists in Europe and America. The habitual use of drugs of a stimulative and restorative character was prevalent in India probably before they were used in any of the other countries of the modern world. The juice of the 'soma plant' was a favourite drink of the Aryan settlers and was regularly taken by them many centuries before the Christian era. What exactly the 'soma plant' was, is not known, though a number of plants, such as *Cannabis sativa*, *Ephedra vulgaris*, *Asclepias acida*, have been implicated. During the Hindu period, i.e., up to the 8th or 9th century A.D., alcoholic beverages were used by the people as well as the preparations made from hemp drugs. These produced not only a sedative effect, but also brought about euphoria in the form of pleasant dreams, forgetfulness and, it would also appear from the writings of that period, voluptuous satisfaction. Opium and poppy were introduced on the west coast about the 9th century A.D. by the advent of the Mohammedan traders, and opiates soon came into use. A study of records shows that during the period of the Moghul Empire, alcoholic beverages, opiates and hemp drugs were freely used. A decoction made from poppy capsules known as *koknar* was extensively used all over India, and is used to the present day in parts of the Punjab. A beverage containing wine, opium, Indian hemp and poppy capsules, known as *chaharbargha* (four-leaved), was drunk by the well-to-do classes in the time of Akbar (1556 to 1605) and later. Opium on account of its stronger effects appears to have taken a great hold of the people and poppy was extensively cultivated all over the country during this period and was indulged in by all classes.

OPIMUM

Opium eating and smoking.—The author's work in the field has shown that most of the raw opium sold in the country is used for addiction purposes in one form or another. It is generally consumed in the form of a pill or solution in water. Opium smoking although not common is still practised in the lower strata of society in many parts of the country. It is common in Assam and in certain parts of the Central Provinces and Berar. The proportion of opium smokers to opium eaters in Assam has been variously estimated from one-third to half of the total addicts, but our recent enquiries show that the number has now come down to a quarter. The Government of India and all the provincial governments have adopted the policy of checking opium smoking by

diminishing the facilities for the practice of the habit through legislation. These measures have succeeded to a great extent and as a result of this the habit has greatly declined.

Although opium is habitually used by large sections of the population at the present time, the indulgence is not so widely prevalent as might be imagined from some of the recent publications on the subject. The Government of India have strictly adhered to their promise to the League of Nations and have progressively reduced both the production and consumption of opium. We have shown that, although if the country is taken as a whole the consumption of opium is low, in certain parts it is very high. For example, in Bengal presidency taken as a whole, the consumption per 10,000 of population is 8 seers per annum instead of 6 seers required for the medical and scientific needs; in the town of Calcutta it is 58 seers, Hooghly district 21 seers, Howrah 16 seers and 24-Parganas 15 seers. In the Madras presidency taken as a whole it is 8 seers, but for East Godavari and West Godavari it is 37 and 22 seers respectively. For the Punjab as a whole it is 12 seers, but for Ferozepore district 33 seers, Lahore 34 seers, Ludhiana 25 seers, Amritsar 30 seers. For the whole of Bombay presidency it is 10.05 seers, but is considerably higher in the towns of Bombay and Ahmedabad and in Broach district. In the whole of the Central Provinces and Berar it is 9.0 seers, but in Amraoti it is 40 seers, Akola 50 seers and in Balaghat 30 seers. For the United Provinces as a whole it is 4 seers but the incidence is high in a few districts, *e.g.*, Cawnpore, Benares and Lucknow, where the consumption rate is 19, 21 and 17 seers respectively. In Assam as a whole it is 19 seers, but in Lakhimpore it is 70, Sibsagar 45, Nowgong 27, Darrang 22 and Kamrup 8.9 seers. The highest consumption rate recorded in India is in the Sadiya frontier tract, being 94 seers. The high figures are due to smoking of the drug, which necessitates a much higher consumption per head.

On the other hand, there are extensive areas in all provinces where consumption is very low, *i.e.*, 1 to 5 seers per 10,000 of population per annum. Such areas are now on the increase. In Assam, Goalpara and Sylhet are the examples. In the Bombay presidency (Kanara and Bijapore) and in the United Provinces many of the districts can be grouped under this head. In the Punjab there are 20 out of the 29 districts where the consumption of opium is below the standard laid down by the League of Nations as being necessary for purely medical and scientific needs of the population, *i.e.*, 6 seers or 12 pounds per 10,000 of population per annum.

It will thus be seen that the habit is not widely disseminated among the population, its incidence among various classes is very irregular. The areas with a high consumption rate are being investigated with a view to determining the causes which have led to it, and steps are being taken to put down excessive use of the drug. A perusal of the following table will show that the consumption of opium in India has fallen considerably during the last 20 years:—

Year	Consumption of opium in seers* in British India (excluding Indian States)	
1912-13	..	506,664
1930-31	..	241,211
1931-32	..	213,000

* 1 seer is approximately equal to 2 pounds.

If 10 grains is taken as the average daily dose, then there are roughly 1 to 1½ million persons in India who habitually take this drug.

The average dose taken in the writer's recent series of over a thousand cases was roughly 10 grains daily

per addict as compared with 20 grains worked out by the Opium Commission of 1895.

Addiction to opiates in this country, although it is still very extensive, does not appear to exist in such intense and pernicious form as it does in the west with morphine and other alkaloids of opium. It may be stated here that in the old days, when opium was cheap, addicts were undoubtedly met who took 180 to 500 grains of the drug daily. The writer in recent years has met with only a few individuals who took more than 50 grains daily; many of the old addicts, however, take more than 15 grains daily. The chief reason for smaller dosage is that the price of opium has risen enormously. Whereas during the pre-British period, in the Punjab, opium used to sell at 2 to 3 annas (2 or 3 pence) per 'tola' (180 grains or 12 gm.), in 1901-02 it cost 8 annas for the same amount and in 1929-30 Re. 1-12-0 (half a crown).

Administration of opium to infants.—Habitual administration of opium to infants at certain periods of their lives has been prevalent in India for many centuries. The habit appears to have been started because of the drug's power of allaying diarrhoea and vomiting, relieving cough and pain, and producing sleep. The custom, although it is still met with in almost every part of India, has greatly declined during the last two or three decades. The drug, however, is still extensively employed in the Central Provinces and Berar and in the industrial areas in all parts of India.

In Berar it is stated that 75 per cent of the infants are doped with opium and that 25 per cent (*i.e.*, 6,198.5 lbs.) of the total opium consumed goes to infants. The consumption is still higher in the cotton-growing areas where children account for 40 per cent of the total consumption. The main reason for administering opium is economic, the drug being given to keep the children quiet so as to allow the mother to carry out her work, whether in the factory or the field, unhampered. The practice is begun during the first few weeks of the infant's life, the earliest time to commence being 3 weeks and the latest period 3 months. The drug is usually discontinued when the child attains the age of 2 or 3 years, that is when it begins to play about and can live on ordinary food. The dose varies from one-eighth of a grain to three grains daily. The drug affects the child's health adversely and hinders growth. The children receiving opium have an emaciated, unhealthy and toxic appearance. They are more liable to catch infections and to attacks of epidemic diseases and the mortality rate among them is comparatively high. Although deaths from overdosage are not frequent, they do occur. Non-fatal overdosage is not uncommon.

Addiction to Post (unlanced capsules of Papaver somniferum).—The poppy capsules are known to have been used for their saporific properties by the ancient Egyptians, Greeks and Romans. For many centuries they have been used in the Chinese, Hindu and Mohammedan medicines as a sedative in inflammatory diseases of the alimentary and respiratory tract. During the 16th, 17th and 18th centuries when the Moghuls were in power in India, the capsules were extensively used to prepare a beverage which had soothing and euphoric effects and which was almost universally indulged in. The habitual use of poppy capsules for euphoric purposes has considerably

decreased during the last three decades but the addiction is still prevalent in certain districts of the Punjab, and in many parts of Rajputana. The present writer after a study of over 500 addicts has come to the conclusion that habitual use of poppy heads produces physical, mental and moral degeneration in the habitué; as compared with the opium habit its effects on the individual are much more pronounced.

Addiction to opium alkaloids.—Habitual use of morphine has considerably increased in India during recent years, the increase at present being confined to northern India. There appears to be grave danger of rapid extension of this habit to other parts if steps are not taken to check it. Morphine addiction among Indians is usually met with in young persons between the ages of 20 and 25 years. The habit is not started for the sedative and analgesic effects of the drug as in western countries, but for its euphoric effects and because of its supposed aphrodisiac properties. Formerly the alkaloid was taken almost exclusively by the mouth, but recently the injection method is coming into use. By this latter method, the effects produced by the drug on Indians are very similar to those produced by cocaine. The habit produces a state of chronic toxæmia and detrimentally affects all tissues of the body, particularly the nervous tissues. In morphine habitués physical, mental and moral deterioration sets in much more rapidly than in opium addicts.

Two kinds of poisons are concerned in producing the toxæmic state: (1) the exogenous poison, *i.e.*, the drug itself which is rapidly absorbed after injection and circulates in the blood, and (2) the endogenous toxins which are formed by the action of the alkaloid on the general metabolic processes of the body, biochemical changes being thereby set up. Both these factors combined interfere with the normal functions of the organs giving rise to debility and malnutrition. General toxæmia and improper assimilation of food products lead to wasting, sallow colour and anæmia, and finally a cachetic condition may supervene. Addiction to other alkaloids of opium, *e.g.*, codeine and heroine, is very rare in this country.

HEMP

Indian hemp grows wild in the montane and submontane tracts over the whole of the north-eastern and north-western parts of India and three of its preparations, *i.e.*, *bhang* (dried leaves), *charas* (resinous exudate) and *ganja* (flowering tops) were in the past largely used by the poorer classes, on account of their very low cost. Even to the present day hemp drugs are the narcotics most extensively employed by the poorer classes throughout the country. Extensive work in the field has enabled the writer to estimate approximately the prevalence of hemp drugs addiction in India and, taking the country as a whole, the incidence of addiction in British India ranges between 0.5 to 1.0 per thousand of the population. In south India where the spontaneous growth of *Cannabis sativa* does not occur, hemp was and is still cultivated for use as a drug of addiction.

The following table gives the total quantities of hemp drugs supplied through licit sources used for habitual consumption in India :—

1912-13	..	..	996,783 seers
1930-31	..	..	547,630 "
1931-32	..	..	511,307 "

Besides this there is little doubt that large quantities reach the people through illicit sources also.

From a close study of 1,500 cases, the average dose worked out in the case of *charas* and *ganja* is 5 to 10 grains daily and of *bhang* a little more than double this. There are approximately 1 to 2 million persons in India who habitually consume hemp in one form or another. The consumption of hemp drugs is highest in the United Provinces and then follow Sindh, Delhi, the Punjab and North-West Frontier Provinces.

The physical and mental effects produced by these drug habits appear not to be so marked as opium, but they undoubtedly lead to mental and moral degeneration. When under the effect of these drugs, the addicts appear to lose all idea of correlation of time and space. They forget their environment and do not know what they are doing. *Ganja* and *charas* are much more potent in this respect than *bhang* and their excessive consumption, especially of the latter, gives rise to insanity and leads to crime. This was one of the points discussed by the Hemp Drugs Commission, but no definite conclusions could be arrived at. Some work has been done by the author in this connection in the Ranchi Mental Hospital. Out of 1,600 patients examined in this hospital as many as 600 (35.5 per cent) gave a history of drug addiction; in more than half of the latter, the history of hemp drugs (*charas* and *ganja*) addiction, and in a third the history of alcohol could be distinctly traced. Out of 600 cases discharged from the hospital as cured, in 213 the cause of insanity was drug addiction. Out of 350 criminal insane patients, 114 or 38 per cent gave a history of addiction to hemp drugs. These figures appear to show a distinct relationship between drug addiction, insanity and crime, but to come to a definite conclusion more work is necessary.

Alcohol.—The use of distilled alcoholic liquors has extended during the early part of this century but has decreased lately. In the old days distilled liquors were used to a very limited extent; wines were largely used. The aboriginal races of India made a beverage by fermenting rice—*pachwai*—and by fermenting palm juice—*tari*. Both these are extensively used in many parts of India to the present day. The fluid that is habitually drunk by the Nagas of the Assam hills (Manipur State) is a weak country beer called *zu*. The present writer has shown that the alcoholic content of the majority of the crude beers used in India is low and their nutritive value is very high. Some of these beers are rich in vitamin content which is often poor in the general dietary of the people who drink them. The areas where such beers are consumed are remarkably free from deficiency diseases. Distilled country liquors and foreign liquors are used by the richer classes to a comparatively lesser extent.

The drinking of youth and the social drinking in the endeavour to mitigate the wear and tear of life and to get relief from its annoying factors, as it exists in the west, is not commonly found among Indians. Extensive habitual use of alcohol is uncommon and

the harmful effects produced by it are rarely encountered. The problem of alcoholism has not up to the present time assumed a serious aspect in this country. It may however be pointed out that the use of distilled country liquors is rapidly increasing in certain areas and in many parts of India drunkenness is being more frequently encountered among the masses. This is due to the fact that while restrictions are being imposed on the sale of opium and hemp drugs and their price has risen owing to the increase of excise duty, in spite of the high excise duty a bottle of distilled liquor can still be purchased for a few annas. Country liquors in many parts are taking the place of opium and hemp drugs.

Cocaine.—The present writer has shown that cocaine came into use quite accidentally about 50 years ago. In spite of all the restrictions imposed on the import, possession and sale of the drug, the habit has spread from Calcutta to large towns along the two main railway routes through the Central Provinces into the Punjab and the North-West Frontier Province. From Bombay it spread to some of the large towns in that presidency. Cocaine is not manufactured in India but is smuggled into the country in large quantities. For some time past the Far Eastern has driven the European and American manufactured product out of the market. The drug is illicitly brought by crews of ships running between Calcutta and the Far East and is heavily adulterated before it is sold. Cocaine is usually taken in the form of an injection or as a snuff in western countries, but at present practically the only method of taking the drug in India is by the mouth. It is commonly consumed by putting it in *pan* or *betel* leaf, and for that reason addiction to this alkaloid is prevalent among the *betel*-leaf-chewing population of north-west India, Bengal, Bihar, the United Provinces and the Punjab. The habit not only exists among the well-to-do people but a large number of the artisan class in large towns are also addicted to it.

It has been calculated by competent authorities that over 200,000 ounces of cocaine were smuggled into India in 1929 and that the consumers paid between Rs. 270 lakhs and Rs. 648 lakhs to the retailers for their doses of the drug. The symptoms and effects produced by it were studied in 200 cases; the cocaine habit is one of the most pernicious of the drug habits and the serious toxic effects produced by it on the Indian addicts have been shown by the present writer.

New drug habits.—During the last few years chloral hydrate as a drug of addiction has also made its appearance in northern India. It has come into use since the price of spirituous drinks has gone up considerably on account of the increased excise duty. Most of those that drink alcohol habitually in India do not take it merely to obtain mild excitement or sedative effects, as is usually the case in the west, but to obtain intoxicating effects. Owing to increase in the price of liquor they cannot afford to buy sufficient quantities for this purpose and the ingenious idea of potentiating the effects by adding small quantities of chloral hydrate

(0.5 to 1.0 gm.) has occurred to them. The drug is also sometimes mixed with tea and is habitually consumed by some people. The chloral habit has thus sprung up, though fortunately a very limited area is affected at present. The drug is powerful and toxic, and several fatalities have been reported from accidental overdoses. Chloral hydrate is a cheap product selling at about Re. 1-12-0 (half a crown) per pound, and as there are no restrictions to its sale at the present time it can be bought by anyone in any quantity from any chemist's shop. Half to 1 gm. or a little more added to an alcoholic drink produces symptoms of intoxication followed by sleep. The habit is harmful and dangerous. It is much more liable to produce pathological changes in the organs and immediately fatal results than any other drug of addiction in this country. The mental, moral and physical effects produced by this addiction are more pronounced than in any other drug habit. The drug is cheap and is easily procurable as there is no control over its sale. These factors are largely responsible for the spread of its use among the population in certain localities. There is a danger of the use of chloral hydrate for adulteration of alcoholic beverages (toddy, rice-beer, etc.) being extended and of the further spread of the chloral habit.

Barbituric acid derivatives.—During recent years a large number of the barbituric acid compounds have been introduced into therapeutics, including barbitone (veronal), sodium barbitone (medinal), luminal, dial, allonal, veramon, neobutal, amytal, evipan, pyramidon, etc. Circulars from manufacturing firms regarding the safe and sure action of these drugs have been freely distributed which influence not only the medical practitioners but the lay public also. Wilcox and Purves-Stewart have described a series of cases of addiction to barbitol and allied drugs, and the Drug Addiction Inquiry has been alive to the possibility of the formation of such habits in India. A number of fatalities resulting from indiscriminate therapeutic use and self-medication with these drugs have occurred and a few cases of addiction have also been observed among the educated classes in India. The fact that, besides the toxic effects produced by massive doses, the barbiturates also produce dangerous cumulative effects and a tendency to habit formation has not been sufficiently appreciated by the medical practitioners in this country. A warning is therefore necessary.

The drugs of this group have effective sedative and hypnotic properties, and, as they are analgesics also, they are largely used by the medical profession. In Great Britain all the barbituric acid derivatives are placed in Part II of the Poisons Schedule, 1918, i.e., they cannot be dispensed without the prescription of a qualified medical man. In India, however, they are not classed as poisons and are therefore not included in any of the schedules of the Poisons Act of 1919 (amended in 1931). These drugs can thus be bought

by any one and their use is increasing. The need for bringing the sale of barbituric acid derivatives as well as hypnotics like chloral hydrate, paraldehyde, sulphonal, trional, tetronal, etc., under control is therefore very urgent.

Briefly then the principal habit-forming drugs used in India are :—

1. Opium is still extensively used both by adults and infants. *Post* or *koknar* (unlanced capsules of *Papaver somniferum*) were largely used at one time, but owing to restrictions in the cultivation of the poppy their use is now limited to a small area in northern India. The use of morphine, though uncommon, is gradually increasing. It has been estimated that in British India alone out of a population of twenty-seven millions at least 1 to 1½ million persons take opiates habitually in spite of all the efforts that are being made to stop their use. In the Indian States especially in Rajputana the incidence is much higher.

2. Hemp drugs. *Bhang* (dried leaves), *charas* (oleo-resinous exudation) and *ganja* (dried flowering tops coated with resin) are extensively used all over the country in the lower strata of society on account of their very low cost. At a very moderate estimate at least 1 to 2 million of the population of India take hemp drugs habitually.

3. Alcohol. *Pachwai* (fermented rice) and *tari* (fermented palm juice) are largely used by the poorer classes. Distilled country spirit and imported liquors are used by the richer classes.

4. Cocaine was introduced 50 years ago; its use is spreading in northern India.

5. Chloral hydrate has been introduced during the last 10 years. Barbituric acid derivatives are being tried, the use of these drugs at present is limited; but there is danger of their extension for adulteration of alcoholic beverages.

Etiological factors.—It will be observed from the foregoing that the first three groups of drugs, which are commonly used in India, are mostly raw and crude products. In many cases they have to be prepared by the addict himself before use, which in itself limits their excessive consumption. Further by using crude products the addicts absorb comparatively smaller quantities of the active principles which are responsible for producing the toxic effects. In western countries almost all the drugs used for addiction purposes are highly purified products such as morphine, heroine and cocaine. Moreover many of these drugs in the west are taken in the form of injections. This method brings about the action more quickly and more intensely. At the same time the action is not so lasting as when the drug is taken by the mouth. All these factors lead to a greater desire or craving on the part of the addict for more frequent repetition of the dose and the habit is liable to be carried to excess and the addict to become a danger not only to himself

but to society. In India most of the common drugs of addiction are taken by the mouth and being crude products never produce such intense effects as are observed in western countries. A large number of addicts from the lower strata of society are so poor that they have not the means to carry the indulgence of even the crude and cheap drugs to excess; the upper classes are temperamentally more moderate. Besides, India is pre-eminently an agricultural country, which makes it possible for the majority of its inhabitants to lead a comparatively free and easy existence. The strain and stress of life which drive people to the habitual use of sedative drugs is not so great as in the west.

In spite of all these factors the problem of drug addiction is of very great importance from its extensiveness. The magnitude of the problem can be judged by the fact that, whereas in most of the countries in Europe and America the addiction rate of the population is from 0.1 to 0.2 per cent or even less, in many provinces of India the rate is 1 to 3 per cent or even more. These drug habits are responsible not only for much economic loss but they also lead to physical and mental deterioration and are of very great importance from the health point of view.

Another noteworthy feature of drug addiction in India, especially insofar as opium and hemp drugs are concerned, is the religious and social aspects of the problem. Indulgence in opium, on account of age-long usage and custom, is sometimes compulsory on such occasions as marriages, deaths and social gatherings among certain classes. Hemp drugs are considered to be the food of the gods and are offered in temples on religious festivals and ceremonial occasions. Some religious sects take these drugs under the belief that they help the individual indulging in them to free his mind from worldly attractions and in this way to concentrate on the deity. This is the reason why in places of religious worship, like Benares, Mathura and Puri, there is an enormous consumption of these drugs. Such use of these drugs is, however, rapidly decreasing.

The medical and semi-medical uses of opium and hemp drugs is another important factor. In a vast country like India, where the facilities of medical relief are poor, the majority of the population do not get the benefit of western medical science. The sedative drugs such as opium and hemp preparations are largely used as household remedies and habits are often formed from such use. The doping of infants with opium can partly be attributed to this. It is still firmly believed by the ignorant masses that opium is a wonderful tonic to the child, it stimulates his growth and prevents the child getting sick. The writer has discussed fully elsewhere the medical and semi-medical uses of opium and the large variety of conditions for which it is used as a household remedy.

Almost all the diseases for the relief of which opium and hemp drugs are used are of minor character. Often the drugs are taken to dry secretions from the conjunctiva and the respiratory tract. Many people suffer from toxæmias of focal sepsis, which causes pains of the rheumatic and neuralgic type, mental depression, irritability and hypersensitiveness of the nervous system; these drugs in small doses give them relief and they form the drug habit.

Opium is believed to stimulate physical energy. Those who have to do with coolies in the tea gardens and with labourers in rice and wheat fields in India realize the value of this drug to those who have been exposed to cold and chill. The writer found that the use of opium increased during the harvest season in many districts in the Punjab by 50 per cent.

TREATMENT

The medical profession in this country is very ill-informed on the subject of drug habits and their treatment. During the course of his investigations in different parts of the country, the writer had not come across many medical men who had any considerable knowledge regarding the treatment of drug addictions or of the phenomena which accompany abstinence. The general impression appears to be 'once a drug addict always a drug addict; he is incurable and that is the end of him'. Ordinary hospitals generally refuse to admit addicts; mental hospitals are not suitable for many reasons. There are no institutions established anywhere in India and the institutional treatment under expert guidance is unknown. It would certainly be advantageous if a few specialized institutions of the type of abstinence sanatoria were established in areas where the incidence of addiction is very high so that treatment could be carried out on scientific lines. There is no doubt that the public would take advantage of them. The writer's experience, so far as the treatment of addictions is concerned, is therefore limited to the non-institutional methods.

From the point of view of treatment, the drug addicts in this country are divisible into three main groups :

1. There is a large group who use opium or hemp drugs in small or very moderate quantities. The majority of these have started the drug after the middle period of their life, generally for some minor disease or ailment. They usually start with a small dose and do not increase it. The narcotic and the euphoric effects of the drug have no attraction for them; indeed they are not produced in this group at all. The habitués thus have no temptation to increase the dose, in fact they fully appreciate the evil effects which would result from it. Most of them are good and successful citizens and carry on their daily work quite efficiently. The writer has known numerous persons who

have taken small doses of opium or hemp drugs for 20 or 30 years without any apparent harm. As a matter of fact it would appear that the drug was doing them good as its stoppage made them ill and prevented them from carrying out their ordinary work. It stands to reason that, when a person can lead an active and useful life on fixed and unchanging doses, there can hardly be any mental or moral deterioration. Treatment in this large group would appear to be quite unnecessary. Some of this group, however, gradually increase their doses and suffer from the toxic effects of the drug. In such cases only, treatment is desirable and is wanted.

2. The next and a very large group consists of those who owe their entry into the paths of addiction to the association with and the example of other addicts, and to no other reason. Some of these are normal individuals who are anxious to be treated, and they respond quite well to treatment. A proportion, however, start the habit from idle and vicious seeking after new sensations; they take the drug for its pleasure-giving effects and for sexual stimulation; these people are generally found in large towns. Many of them have some defect in their character and mental make-up, and appear to be engrossed in furthering their indulgence and increasing the dose. They also have a tendency to indulge in more than one drug at the same time, e.g., alcohol and opium, alcohol and cocaine, alcohol, opium and hemp drugs. This class of vicious addict is the most difficult from the point of view of treatment. Fortunately this type, which is more in evidence in western countries, is not commonly met with in India. The few that exist belong generally to the rich and indolent classes. They do not seek treatment and nothing short of forced confinement in a special institution, and prolonged training and reconstruction of character, will restore them.

3. There is the third smaller group of habitués who have started using the drug in an attempt to tide over a period of special strain or gross overwork and fatigue. This class of addict is the product of large towns and their percentage is not nearly so high in India as in the west. This is the class who are anxious to get rid of the habit, are easily amenable to treatment, and do very well even under non-institutional treatment.

PROPHYLAXIS BY THE MEDICAL MAN

The importance of prophylactic measures in preventing drug addiction is appreciated by the medical profession in India and most habit-producing drugs are used with great care. While an analysis of the histories of drug addicts in western countries shows the medical man has been unwittingly responsible in starting addiction in a large number of cases, in India the writer has not come across many cases in

which addiction to opiates or hemp drugs could be attributed to their use by the medical practitioners in the first instance. With cocaine and morphine addiction, however, this has occurred quite frequently. In India, where addiction to crude drugs is in vogue and the alkaloid addiction so far as opium derivatives are concerned is uncommon, the importance of prophylaxis by the doctor does not play such an important part as in western countries. The stringent restrictions imposed by the Government on the distribution and sale of narcotic drugs (opium and its derivatives and cocaine and its derivatives) has to some extent safeguarded the spread of alkaloid addictions. Such drugs are not allowed to be sold except when prescribed by a qualified medical practitioner; the dispensing chemist has to keep a careful account of every grain of the drug sold, in books kept for the purpose which are frequently scrutinized by the authorities.

TREATMENT OF OPIUM ADDICTS

Sudden and gradual withdrawal.—The withdrawal of the drug by the 'sudden method' advocated by Bonhoeffer has been recognized to be scientifically the best method of treatment in many countries. In spite of the success achieved with it in Europe and America it has not been possible to carry it out in India. The writer has tried the method, but has met with little success. The reason is that the conditions under which the cases were treated were far from ideal. There are no specially-equipped institutions in this country where addicts undergoing this form of treatment could be housed and could have all the facilities to help them through the critical period of abstinence symptoms. The post-withdrawal insomnia and the digestive and other troubles are extremely distressing and need efficient handling. Some of the writer's cases had to be treated in the wards of an ordinary hospital. Some were treated in their own homes where the success of such a treatment was doubtful from the beginning. The writer's experience, therefore, with regard to the 'sudden withdrawal' method is limited and unsatisfactory from every point of view. Although he has no personal experience of such treatment in special institutions, he has no hesitation in saying that, so far as Indian addicts are concerned, the sudden withdrawal would imply a period of frightful physical and mental suffering and trial which the majority of them would be unable to bear. The shock of sudden withdrawal would be too much for many of the addicts and even those with strong will-power determined to get rid of the habit will stand it with difficulty. It would make the most willing and determined of them lose confidence and they would end by refusing to go through the treatment. Their sufferings would make them lose their faith in

the treating physician, and they would become distrustful and hostile so that it would become difficult to establish friendly relations or to inspire confidence in them. The writer has often heard inveterate opium eaters remark that they would rather endure hell than the abstinence symptoms. Experience in India is in accord with that of many authorities in the west who consider that the patients subjected to harsher methods of treatment, such as locking them up and letting them 'suffer it out', are the very ones that are more likely to relapse and go back to the habit. The above remarks apply to the opium addicts only. In the case of hemp drugs, cocaine, alcohol and chloral hydrate, sudden withdrawal can be carried out under non-institutional conditions without any great difficulty.

The writer has met with a great deal of success with the slow or gradual withdrawal method. There is no doubt that whether the process of withdrawal is gradual or sudden, a great deal of suffering has to be gone through by the patient. Administration of no amount of other drugs will completely eliminate the distressing symptoms of abstinence. With the gradual method, however, the pain and discomfort of actual withdrawal are reduced to a minimum. If due attention is paid to the psychological side of the treatment, the patient is made to believe that the physician thoroughly understands his trouble and is doing his best to relieve him of his sufferings, and the chances of a permanent cure are greatly enhanced. The patient may even carry not unpleasant memories of his restoration period. Another advantage is that the post-withdrawal insomnia, which is an extremely distressing condition, is much less frequent. Moreover, under conditions existing in India, it appears to be the method of choice. If the withdrawal is affected with reasonable celerity and with as little discomfort to the patient as possible, it will encourage other sufferers to seek the treatment and those who have relapsed may also return. While it cannot be said how long it would take an Indian patient to be cured if he were to undergo treatment in an institution with the sudden withdrawal method, the experience of many European institutions is that at least three months' stay is necessary. The adoption of such a treatment will, therefore, be very expensive for a country like India. The writer's experience is that with the slow withdrawal method it takes three to six weeks to effect a cure in most of the Indian addicts who are going to be cured. The decrease in dosage is carried out very gradually at first so that it is imperceptible. After a few days it can be effected more rapidly, especially if some pill such as that containing nux vomica, gentian and black pepper is given as a substitute. The substitution is started with the morning dose at first, leaving the evening dose untouched,

this procedure prevents insomnia. Minor symptoms such as diarrhœa, epigastric pain and nausea may be met by giving ordinary alkaline mixtures. Usually in three to four weeks the drug can be entirely stopped.

It cannot be denied that in spite of all precautions a large number of failures result. In many cases when it was hoped that all was going well, it was suddenly discovered that the patient was secretly obtaining a supply of the drug. The ingenuity shown by the addicts in this connection and the extraordinary way in which they evade those on guard is amazing. The chances of the treatment being prematurely suspended are also great. Even by the slow method the withdrawal cannot be effected except by exercising a good deal of compulsion. Most of the patients start with good resolutions but give in about the second or third day when the symptoms are very acute. To keep control over such patients under ordinary hospital or home conditions is very difficult indeed. With full knowledge of all these difficulties the gradual method has been tried under non-institutional conditions with a fair degree of success, especially in addictions of short duration. Considerable care and attention has to be exercised in the selection of cases. Before starting the treatment the patient must be thoroughly examined and any physical conditions which may have led to addiction, e.g., septic foci, must be treated. Duration of addiction is an important factor; cases under 5 to 7 years taking 10 to 15 grains daily are generally amenable to treatment. In many persons taking over 20 grains daily for prolonged periods, circulatory disturbances leading to collapse are likely to supervene if the drug is suddenly withdrawn. Sudden withdrawal is successful and is recommended with addicts taking under five grains daily.

The gradual withdrawal method is also suitable for mass treatment of opium addicts. The writer during the Great War in the East African campaign was in medical charge of a Sikh company of sappers and miners, about 200 strong, from a state in northern India. Most of the Indian officers and men of this unit were heavily addicted to opium, many taking as much as 100 grains daily and some over 200 grains. The unit in the beginning brought a certain supply of opium with it, but this was soon exhausted and men had to fall back on the commissariat supply of 5 to 6 grains daily. With the help of the officer commanding the company the writer had no difficulty in cutting down the dose to a few grains a day, in a month's time, without any of the men showing signs of distress. They gladly went through the cure and some of them gave up the habit entirely. As there were no towns near, the chances of anyone obtaining local supplies were completely eliminated.

The writer has shown that there is a pre-dominant psychic element in opium addiction and the production of abstinence symptoms. He has come across cases of persons addicted to large doses of opium (20 to 100 grains a day), who have been sent to a jail for some criminal offence and their supply was inevitably stopped; they did not however suffer from very marked symptoms of abstinence. During the treatment of addicts to rid them of opium habit, the drug can be largely or totally replaced by substances such as gentian or nuxvomica in pill form without the patients realizing it. Further, if the patient is not aware that he is taking opium, the drug can be effectively given for weeks or months for its therapeutic effects, without producing addiction or abstinence symptoms. A great deal can be done by getting the co-operation of the patient, and proper attention to the psychological side of the treatment ensures success in many cases.

Infantile administration of opium.—The habit in infants and children is not difficult to break. In the usual course of events the parents continue to give the drug up to the age of two or three years and then, when the child can take care of itself, it is stopped. Both the gradual and sudden methods of withdrawal have been tried with an equal degree of success, but it is better to adopt the sudden method. The psychological element plays a very minor part in children and as a rule there is little discomfort. The withdrawal symptoms met with are looseness of bowels, diarrhœa, and irritability of temper, and in severe cases loss of appetite, nausea and abdominal pains also occur. Diarrhœa can be easily controlled by powders containing sodium bicarbonate, bismuth carbonate and aromatic chalk. In severe cases with mental irritability, a bromide mixture with a few minims of tincture of belladonna may help to quieten the patient. The child gets quite well in a few days and a cure is affected; no after-treatment is as a rule necessary. Even the worst cases with marasmus and emaciation begin to put on weight soon after they are rid of the habit.

Opium smoking.—The experience in India is that opium smoking is more difficult to cure than opium eating. Fortunately owing to very strict regulations the habit of smoking opium is now rapidly disappearing from many parts, though it is still prevalent in Assam. The writer's experience of its treatment is very limited, but there appears to be little doubt that an opium smoker is much more attached to the drug than an opium eater. It would appear that although smaller quantities of the alkaloids are absorbed (most of them must be destroyed by heat), the absorption is very rapid from the large surface of the capillaries of the lungs and the respiratory tract, and the effects are sudden and more intense resembling an

injection of morphine. The treatment of opium smoking has not been properly worked out in India. Some authorities allow the patient the drug by the mouth and gradually cut down smoking. Once eating is successfully substituted for smoking, the addict becomes more amenable to treatment.

Post (unlanced capsules of P. somniferum).—It is the common belief among the addicts that *post* does less harm than opium. The writer's experience, however, is not in accord with this view. A person addicted to poppy heads requires comparatively much larger doses of opium to produce a similar effect; moreover the physical and mental effects produced by ordinary doses of *post* are much more marked than with moderate doses of opium. This in all probability is due to the potentiating effects the constituent alkaloids of poppy capsules have for one another. It is more difficult to get rid of this habit than of the opium habit. The sudden method is rarely practicable in these cases, the gradual method being the only one which meets with success. The dose is gradually reduced by half a capsule till a fourth of the original dose is reached and then it is stopped entirely.

Hemp drugs.—The treatment of hemp drug habit is not at all difficult, though it is easier to cure the eating habit than the smoking habit. Withdrawal symptoms as they are met with in the case of opium addicts are hardly ever seen, indeed the patients find no difficulty in giving up the habit of their own accord. In northern India many people indulge in *bhāng* drinking in the hot weather, on account of its cooling and refreshing effects, and give it up in the winter quite suddenly. Hemp preparations when taken habitually by the mouth can be suddenly withdrawn without any marked untoward symptoms. Temporary loss of appetite, constipation lasting for a few days and rarely palpitation and restlessness may occur; all these can be easily dealt with.

Charas and ganja are stronger preparations and, as they are generally indulged in by smoking, their effects on the system and particularly on the nervous system are more pronounced. The will-power of the smoker is weakened and without the physician's help he is not able to give up the habit. Treatment in special institutions with facilities for forcible withdrawal is likely to give the best results. The psychological and mental treatment, and training and education of the addict are as important in the case of hemp drug smokers as in opium addicts, in spite of the fact that considerable physical pain accompanying withdrawal is absent.

Cocaine.—The habit of eating cocaine is easier to cure than that of injecting cocaine. Removal of the addict from the environment

in which he has learnt the habit and from associates in whose company he indulges in the drug, preferably to a place where he cannot get it, often effects a cure. The writer knows of many instances where the individuals from one part of the country went for a few months to another part where they were unable to get the drug and where there were no associates; they were able to conquer the craving for many months at a time without difficulty. When, however, they returned to their old surroundings they again succumbed to the temptation. Similar facts have been observed in addicts who have been kept confined in prisons. They are able to give up the habit during confinement and go for years without the drug; but they generally take it up again after discharge. The writer is convinced that cocaine eating is comparatively a much milder form of indulgence than cocaine injecting.

Psychotherapy and mental training are important; the psychological rearrangement of the personality by finding some innocent emotional compensation will often help the habitué to give up the habit. The drug must be withdrawn all at once and symptomatic treatment given for the withdrawal symptoms. Next to the opium habit, the cocaine habit is the most difficult one to cure in India.

Auxiliary treatments.—Atropine and hyosine have been tried in the earlier stages of withdrawal of opium, and strychnine in the later stages with good results. The belladonna-hyoscyamus mixture recommended by Lambert is useful in that it lessens the shock, decreases diarrhoea, and relieves insomnia. Gastrogenous phenomena are not marked in the treatment of the opium habit, as they are with morphine, and alkaline and acid treatments are not necessary. Adrenaline and ephedrine have been tried for mitigating the withdrawal symptoms in a few cases with good results. It is rarely necessary in this country to use sedative drugs, such as codeine, narcozan, luminal, sodium amytal and pernocton, in the gradual withdrawal treatment of opium eaters and the writer has no experience of the use of these drugs.

Insulin treatment.—Insulin alone or with grape sugar has also of late been tried in Europe. Sakel (1930) used insulin alone in doses up to 80 units in 24 hours to combat withdrawal symptoms in cases where morphine was cut off abruptly, with satisfactory results. F. Braun administered bigger doses of the drug and in addiction employed soporifics like luminal. The author has tried this method with good results.

So far as opium eating is concerned he has carefully tested the effects of the drug on the blood sugar of both diabetics and normal Indians. Small and moderate doses of opium have little or no effect on the blood sugar of

individuals who are not suffering from disturbances in carbohydrate metabolism. In persons whose blood-sugar content is abnormally low, opium may raise it. The blood sugar in the early and mild types of diabetes may be actually reduced. It is only in the severe forms of the disease that the blood sugar is actually raised. In some patients opium does no more than raise the renal threshold of excretion. The writer's findings with regard to opium agree with those of Simenauer and Pulfer, and Anton who found that in human beings, as opposed to animals, morphine produces little or no disturbance of the carbohydrate metabolism.

The utility of diuretics such as novasural and eufhyllin in the slow withdrawal method is doubtful. The writer's observations show that in addicts taking moderate and large doses of opium there is retention of fluid in the blood; in those taking small doses, however, the output of urine is actually increased and the blood fluid is not altered. When the kidneys are damaged and there is albuminuria, the administration of 1 to 9 grains of opium daily produces an appreciable decrease in the quantity of urine passed and in none of the cases are there indications of added damage to the kidneys, which the drug is reputed to cause in such cases.

Vesicatory serum therapy of Modinos in opium addiction.—The method is very simple, cantharides cerate plaster to a size of 8 square centimeters is applied to the patient's chest or abdomen, and after 16 hours serum varying from 2 to 8 c.cm. is taken and reinjected into the upper part of the arm or leg. The operation is repeated on the third or fourth day, and the third injection is given 4 to 6 days after the second injection. The dose of the narcotic is rapidly reduced and may be completely cut off within 3 to 7 days. It is believed that antibodies are formed which create a distaste for the drug but this view is not universally accepted and distaste to the drug is attributed to the production of hypersensibility. Other authorities, like Noordhoek, say that the so-called hypersensibility is not specific but is merely psychological and may be obtained by merely injecting common salt solution. He further states that relapses after the treatment are as common as with other methods.

The writer's own experience with this form of treatment is limited, but the method is being tried in the treatment of opium addicts in Burma jails. Opinion among the medical officers trying the treatment is unanimous on one point, namely that one or more injections of the autoserum from a blister make the addict sensitive to opium. The patients say they do not wish to take opium any more, not because they do not like it, but because the consumption of the drug even in small quantities does not produce the pleasure or exhilaration that it used to produce before. On the contrary the

effects produced by a dose are unpleasant, and heaviness of head, nausea, vomiting, etc., are produced. A distaste for the drug is thus developed and as euphoric effects are not produced opium is not wanted. A control experiment was also tried in the following manner. Some addicts were blistered in the usual way and the fluid from the blister was removed. Instead of the fluid from the blister being injected, in a number of cases injections of normal saline were given. It was found that the addicts who had normal saline did not respond in the same way as those in whom actual serum was injected. In other words, mere blistering did not do any good so long as the serum was not reabsorbed; nor were the effects due merely to the psychological effects of the injection. It is at present difficult to say how long the sensitiveness to the drug of addiction will last, but investigations on this subject are being carried on. It must be remembered, however, that most of the addicts were prisoners under prison discipline and living under conditions in which temptations by way of easy access to opium did not exist. In one of the jails the treatment was tried on two warders who were free to go about and could easily obtain opium if they so desired. In both cases the injections of serum produced the same effects as in the prisoners.

Whether the treatment will eventually produce a permanent cure or not is difficult to say with any degree of certainty but the results so far obtained are certainly striking. The patients gained in weight after the treatment, the appetite returned and the general health improved in a remarkable manner. The following provisional conclusions can be drawn from the data so far obtained:—

(1) That the treatment with vesicatory serum injections is a valuable measure in the treatment of opium addicts.

(2) That probably addicts who have any will-power left will be completely and permanently cured of the habit through its agency.

(3) That probably those who have no will-power left, although they may be temporarily benefited, will relapse as soon as they have the opportunity.

It is believed that about 50 per cent of addicts could be cured by this method.

Lecithin treatment.—Lecithin treatment of opium addicts has been mentioned by Ma (1932) and is being tried in India by the author. From certain observations made on the physical properties of the blood sera of such addicts where it has been found that the protein content, specially the neuro-proteins, is lacking or deficient, particularly during the withdrawal period, the rationale of this treatment can be understood. Ma (1932) from a cytopathological study of chronic morphinism in albino rats found that the withdrawal of the drug in

the addicted animals led to severe pathological conditions of the Golgi apparatus in the cells of various organs. Without treatment these conditions are overcome in 10 to 12 days. Feeding with lecithin, on the other hand, for a period of six days before and for some days after prevented the Golgi apparatus from becoming abnormally reduced; this was accompanied by a condition of general well-being of the animal which was absent in those receiving no lecithin. The treatment has been tried in China on 143 opium smokers. In addition to their ordinary diet the patients are given 6 to 9 eggs per day to enrich the diet in lecithin. The bouts of craving are overcome by administration of tincture of opium in small doses. The lecithin given is prepared from eggs and made into pills with glycyrrhiza powder. The usual daily dose is 4 to 6 grains. It has been found in most of the cases that lecithin, although it prevents most of the untoward symptoms, is insufficient to combat all the withdrawal symptoms, alone. This method of treatment is now being tested in Indian addicts.

After treatment.—The importance of psychological aspects of the treatment of drug addicts has already been stressed. The responsibility of the physician does not end after the drug is withdrawn. The period following the withdrawal is most critical and dangerous and unless great care is taken relapses may occur. The whole of the nervous system has been strained and a thorough reconstruction and rehabilitation of the personality and the character of the addict is imperative if a permanent cure is desired. The physician can do much by way of encouraging the patient and making him believe that by his will-power and firmness he will get rid of the habit. A common belief among Indian addicts is that elimination of the drug habit will leave them sexually impotent. There is no basis for such a belief and the patient should be fully assured that the loss of sexual desire which they observe after giving up the drug is a temporary phenomenon and is a part of the general loss of tone of the organs. It usually passes off in 4 to 8 weeks, but rarely it may last for several months. During the period following withdrawal a good tonic in the form of iron, arsenic and strychnine is very helpful. Occupation therapy is also very important. As soon as possible the patient should start doing some work so that his attention is diverted in other directions. He must lead a quiet life and avoid excesses of all kinds for a year or more after withdrawal has been successfully effected.

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CONSERVATIVE SURGERY IN MALIGNANT DISEASE*

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THE surgery of 100 years ago consisted for the most part in the somewhat barbaric removal of offending members; for operations had to be rapid, and being always septic had to be followed by open wounds. In the absence of anaesthetics and antiseptics, anything beyond the removal of disease was almost impossible. The introduction of anaesthetics increased the

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(Continued from previous column)

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time available for operating, but for many years little was attempted save removal of diseased parts. Antisepsis and asepsis made possible the suture of the wound, and thus paved the way for plastic and abdominal surgery. But for a time operations were still mainly concerned with the removal of diseased organs or limbs, until in recent times, when surgeons have taken more heed of the constructive side of their work. Recent advance in surgery has thus been along two chief lines: (i) physiological surgery, such as the excision of the pyloric end of the stomach to prevent gastro-jejunal ulcer by decreasing gastric acidity, or hemi-thyroidectomy in Graves' disease, and (ii) reparative surgery, such as plastic and orthopaedic operations, tendon transplants, nerve suture, and the rest.

In regard to malignant disease, we have not yet progressed beyond the stage of mutilation. The disease must go, and the operation for its removal must be radical; but the continued advance of knowledge has modified somewhat the extent of our mutilation, and in this paper I propose to describe certain aspects of the surgery of malignant disease in which structure and function can be preserved although the disease itself is radically dealt with. Radium and x-rays are of course the weapons which in recent years have enabled us to preserve limbs and organs which formerly had to be sacrificed.

Malignant disease in limbs

Dr. Vail, of Miraj, wrote a paper on the conservative treatment of sarcomata of bone and similar conditions some 7 or 8 years ago. Before and more especially since reading that paper, I have always attempted to avoid amputation, if it can be avoided consistently with the saving of life.

The danger of sarcoma is not in the immediate neighbourhood of the growth, but is in the blood stream; and it is quite certain that the prognosis of the life of the patient is just as good after a local excision is done—provided it is radical—as it is with amputation, except for one factor, and that is the possibility of dissemination of the malignant cells during the operation itself. To minimize this, I invariably give the sarcoma patient a full course of deep x-ray therapy to the growth and its immediate neighbourhood before operation. Five minutes of 5 milliamps at 5-inch spark gap (90,000 volts) every day for 10 days (screened with 1 millimetre aluminium and with the target at 15-inch distance) is a sufficient dose, and can be given with only a moderate-sized x-ray apparatus.

The following precautions should also be taken:—

- (1) Preliminary radiograph of lungs, to exclude the presence of secondaries.

(2) Gentle handling of the growth during operation.

(3) Spinal anaesthetic (8 to 10 c.cm. of 1 in 1,500 percain) for the lower extremity.

(4) Application of a tourniquet when anatomically possible, to cause stagnation of the circulation, minimizing the spread of sarcoma cells.

(5) Radical excision of the growth, including its true and false (i.e., fascial or muscular) capsule. If any important nerves have become adherent to the growth, radium needles can be left alongside them, being placed there at the time of operation. I generally leave 1 milligramme of radium per $1\frac{1}{2}$ centimetres of nerve tissue, for a week. Radium of similar dosage can be left in the place from which the sarcoma is actually growing, such as the periosteum, or the origin of a muscle.

In cases of periosteal sarcoma, there are two possible ways of dealing with the bone. One is by radium as already indicated; the other is by excision of the segment of the bone from which the sarcoma is growing, with replacement by bone-graft, using the fibula as a graft for the femur or humerus, and tibial grafts for smaller bones. I have followed both these procedures with success in various cases both in arms and legs*. In cases of endosteal sarcoma, the portion of bone involved, as ascertained previously by a good radiogram, must be removed with about three-quarters of an inch of healthy bone on each side, and the bone must be replaced by a graft (except in the case of an upper radius, lower ulna, or upper fibula); see plate II, and figures 5 and 6.

All muscles involved in the growth must be radically removed. The nerve supply of those

* Two femora, 5 ulnae, 2 radii, 1 tibia, and 1 fibula showed no recurrence of round-celled sarcoma within 1 year or more. Unsuccessful cases:—1 femur (secondaries in lungs), 1 ulna (local recurrence, followed by amputation). Cases of less than a year:—2 femora, 2 humerus, 1 tibia and 1 ulna.

DESCRIPTION OF PLATE II

Fig. 1.—Myeloma of tibia before operation. Tibia was cut across just below growth, and its upper end removed. This necessitated the removal of some three inches of the fibula, which was used as a graft to unite the tibia with the end of the femur, the external condyle being used for this purpose for greater stability.

Fig. 2.—Myeloma of tibia after operation. Shows insertion of fibula graft, and reinforcement by Lane's plate. This patient was seen many months later walking about rapidly, in spite of the shortening.

Fig. 3.—Myeloma of lower end of femur. This was scraped out and treated conservatively, there being enough of the bone left to support the weight of the body. To prevent any deformity at the joint, however, a plaster-of-Paris splint was worn for the first six months.

Fig. 4.—Endosteal sarcoma of femur. Treated similarly to the tibia in figures 1 and 2. Patient went out of hospital fit, but has not been seen since.

PLATE II



Fig. 1



Fig. 2

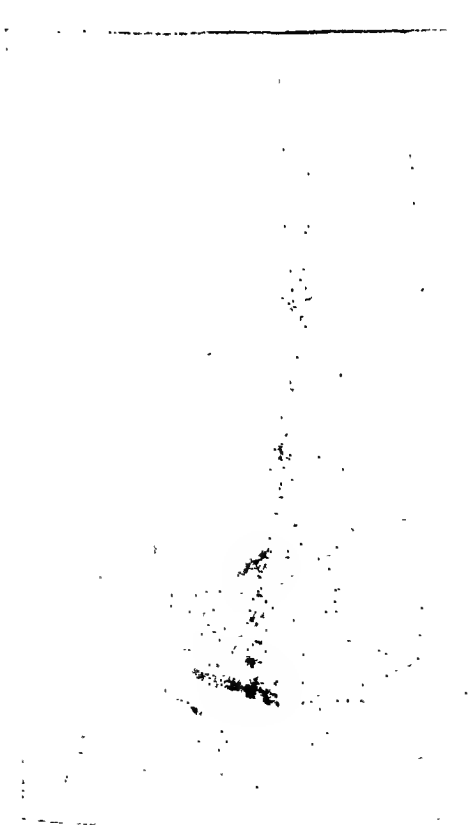


Fig. 3



Fig. 4

muscles which are left must be carefully preserved if possible. It is surprising what good preservation of function in a limb is possible when a number of muscles have had to be sacrificed; judicious tendon transplantations may have to be done in some, but not by any means in all cases.

After the operation, I invariably give a course of x-ray treatment (as outlined above), as soon as the skin has healed, to the region where the growth was situated.

In cases of myeloma, it is sometimes necessary to remove the bone just as in an endosteal sarcoma, but allowing less margin beyond the macroscopic edge of the growth as seen in a radiograph. But if there is some strong bone left, the myeloma should be scooped out thoroughly and carefully, and its bed canterized with pure carbolic acid (not with heat nor by radium, both of which destroy osteogenetic cells). Grafts, if necessary to support the bone, can be put in six months or more after the wound has healed, and usually 'take' very well in these cases; see Plate II, figures 1 to 3.

In cases of multiple myeloma or fibrocystic disease, parathyroidectomy must be done.

In abdominal sarcomata, excision is to be done where possible, but, when preliminary diagnosis has rendered the presence of sarcoma probable, deep x-ray therapy should precede the excision and may have to be given after the excision also.

A simple-looking rounded retro-peritoneal sarcoma is often quite inoperable, whereas a more complicated growth may be fairly easy to remove. One patient of mine two years ago had a sarcoma growing from the jejunum about six inches below the flexure. It was found to be firmly attached to the left kidney, but the mass of growth—plus kidney—was freely movable in relation to the posterior abdominal wall, and was excised together with two feet of jejunum with comparative ease. This mass was considerably larger than a large grapefruit, and would have been a difficult tumour to treat with x-rays, but preliminary x-ray treatment, excision, and post-operative x-ray treatment were performed, and convalescence was uneventful. The patient reports every six months for further examination; there is at present no sign of recurrence (2 years).

Many cases of abdominal sarcoma are treatable by x-rays, and in a fair proportion they can be destroyed or at least rendered inactive. I have a case of sarcoma of the uterus who is being kept alive by 6-monthly x-ray treatment; the growth shrank up to one-third its size during the first two months, and has been kept at this size by deep x-ray therapy for three years, though it still tends to grow if left to itself, shrinking after each course of x-rays.

In many cases, however, nothing can be done against abdominal sarcoma; efficient x-ray

therapy produces fatal histamine shock, while inadequate therapy is no good.

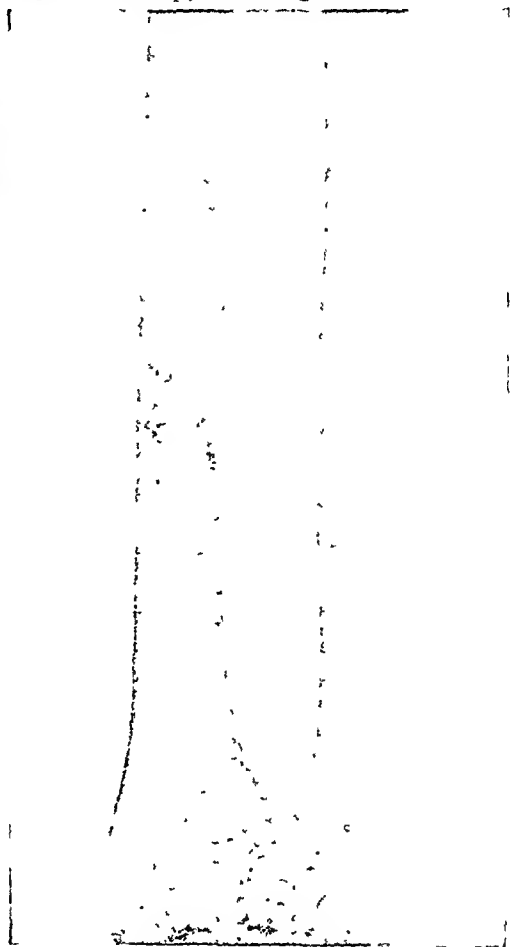


Figure 5—Non-osteogenetic periosteal sarcoma of radius. This was treated by free excision, the bone being bared, but no bone being removed. Radium used on the surface of the bone from which the tumour had been growing, in addition to full doses of x-rays before and after operation. No recurrence in 18 months.

Carcinoma

Here radium is our great stand-by for the avoidance of mutilations, and its use need not here be described in detail. But in my opinion it should only be used for carcinoma of the soft parts, and not in any cases involving bone. For cancer of the lower jaw (and usually the upper jaw also) radical excision is the only justifiable line of treatment in most cases, for if radiated they develop osteomyelitis, which leads to necrosis of bone and is very slow in healing, and very painful. But in cancer of the cheek, tongue, or lips, useful organs may be preserved and prolonged plastic procedures dispensed with if radium be used.

The question of carcinoma of the breast is still discussed in circles where radium is available, but my personal view—to which anyone whose supply of radium is limited will probably subscribe—is that in all cases of undoubted carcinoma of the breast the full radical operation should be done, including all glands up to

the clavicle and both pectorals, radium being used for mediastinal or supraclavicular glands, or other places according to the operator's judgment, such as places where enlarged glands have been found or have been adherent.



Figure 6.—Final stage of a case of sarcoma of lower end of tibia. The growth was endosteal, in the lower end of the shaft. A piece of tibia was excised including the growth and a small margin of healthy bone on each side. This left an extremely small piece of tibia for the articulation, less than one-quarter of an inch thick. A small tibial sliding graft was inserted into the gap about six months after the first operation. The fibula was straightened and shortened, two small wires being placed around it at the site of the mortise. The graft and the lower end of the fibula both slowly increased in size, and six years after the first operation the radiograph here reproduced was taken, showing how firmly the graft has united with the lower end of the tibia, and how thick it and the fibula have become, the latter having burst the wires which surrounded it. The patient is walking long distances without tiring, the leg being $1\frac{1}{2}$ inches shorter than its below. The patient was 16 years old at time of operation, and is now 23.

Carcinoma of the uterus is 'treatable by radium if it is operable by Wertheim's hysterectomy'. If it is inoperable owing to direct extension, radium is sometimes worth trying. If it is inoperable because of extension to glands, it is in my opinion very seldom justifiable to attempt removal either by operation or radium.

Nevertheless a laparotomy should be done; firstly, by it we may discover the growth to be operable, or more probably treatable by radium followed by operation; secondly, if it is inoperable the patient is going to have a miserable death which it is our duty to make as merciful as we can, and this we can do by the removal of the hypogastric plexus (nowadays known by those who have forgotten their physiology as the pre-sacral nerve or nerves). A complete clearance of the front of the last lumbar vertebra between the peritoneum in front (to which the nerves are often adherent) and the anterior common ligament behind, and between



Figure 7.—Three typical cases of sarcoma of the ulna, all dealt with by local removal.

the two divergent common iliac arteries and veins on the two sides, will deal effectively with about 90 per cent of the pain which the unfortunate victim is going to have before her death. The bladder pain, if present, is not usually controlled nor prevented by this operation, but the sacral sympathetic branches to the bladder (the so-called pelvic nerves, bilateral and going along the utero-sacral ligaments) are usually unattainable in an inoperable growth, and very difficult to find in any case; some operators say they have dealt with the pelvic nerves by alcohol injections into the utero-sacral folds. Pain involving the sacral somatic nerves is likewise unrelieved by hypogastric neurectomy, but this simple ablation of the 'pre-sacral' nerve ought in my opinion to be done in every case of uterine cancer in which the abdomen is opened. In a case with much pain its results are really impressive. A patient of mine who had had no sleep for 5 weeks slept soundly for 4 days and nights after removal of the hypogastric nerves, and that in spite of the fact that pain in the bladder and down the legs had already been complained of, and the true pelvis was already full of growth up to its brim. In several other cases with intense pain, the pain has disappeared completely after this simple

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DURATION AND DEGREE OF IMMUNITY AGAINST SMALLPOX CONFERRED BY INFANTILE VACCINATION

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THE question of duration and degree of immunity against smallpox conferred by primary or infantile vaccination is certainly of very great interest, from both the theoretical and practical points of view. The importance and advantages of infantile vaccination are almost universally recognized and admitted. In most countries vaccination of infants is enforced to a greater or smaller extent by legislation or otherwise. Though this measure in protecting one against smallpox is rather extensively adopted, it is to be noted that infantile vaccination does not protect an individual permanently. The immunity conferred is only for a limited period. Experiments and experience have shown that the protection it affords, though absolute for some years, gradually wears off almost completely. It is therefore in view of this fact that though in vaccination we have had a most effective weapon against smallpox for the last 150 years or so, since Jenner discovered it in 1796, this epidemic disease still prevails throughout in some form or other. It must be admitted, however, that though primary vaccination alone does not afford full protection, it has even then a considerable effect against the epidemics of this disease. The great fall of smallpox morbidity throughout the world, as compared to the pre-vaccination days, is certainly to be attributed to the vaccination in general. To conquer smallpox effectively and protect an individual permanently against it, both primary or infantile vaccination and re-vaccinations at a proper period or interval are absolutely necessary. This point is fully realized by some countries in which both these are compulsorily enforced. But the periods fixed for the latter vary considerably. There appears to be a complete lack of uniformity about it, though it is generally believed that primary vaccination protects one for seven years.

Practices in various countries

In Germany, vaccination of infants is compulsory and re-vaccination is enforced as a rule on entering school and at the time of conscription,

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operation. In operable cases, or cases treated by radium, hypogastric neurectomy is a safeguard against future pain should there be a recurrence. The surgery of the sympathetic system is at present only that of mutilation or extirpation; perhaps, as knowledge increases, it too will advance to something constructive, and become more physiological and less strictly anatomical in its principles.

but as a whole it is obligatory at the 12th year. In France, infantile vaccination during the first year of life and re-vaccination during the 11th and 21st years are compulsory. The same legislation as in France is in force in the Union of Soviet Republics. In Italy, vaccination in the second six months following birth and re-vaccination during the 10th year is compulsory. In Portugal, both vaccination and re-vaccination are compulsory and the period of immunity definitely specified by the law is seven years. In Japan, re-vaccinations are obligatory every five years. There is similar legislation in all countries where infantile vaccinations and re-vaccinations are enforced by law. In England, however, the vaccination law is so drafted with a 'conscientious objector's' clause, which practically nullifies the obligation to be vaccinated, resulting in a large number of people, reckoned to be at present nearly 50 per cent of children born, remaining completely unprotected against smallpox. In India, the Vaccination Act was promulgated by the Government of India in 1880. This was amended in 1909, but still it does not enforce compulsory vaccination for the whole of India. There are however several cities and towns where infantile vaccination is made compulsory. But nowhere in India is regular re-vaccination at any period made compulsory by law. It will be therefore seen that there is extensive divergence of views held throughout the world on this important point.

Even scientific observers and experts on the subject seem to hold equally divergent views. Winch contends that re-vaccination at 12 years is generally as positive as infantile vaccination. Gins, of Berlin, on the other hand states that under similar conditions he found only 20 per cent to show typical primary vaccination results and four-fifths of re-vaccinees to be sufficiently protected against smallpox. Kitisato, in Japan, found that nearly 13 per cent can be successfully re-vaccinated at the end of one year and nearly 64 per cent at the end of six years. Weil reported about 72 per cent successful re-vaccinations at seven years' interval. Both these probably have included in their successful re-vaccination also the accelerated reactions. Sergeant and Trener in 1932 analysed about 300 cases of re-vaccination. Most of these were aged two and three years, some 250 of them with scars of previous vaccinations. They found that their results were similar, whether the age periods taken were one year, 10 years or under, and over 30 years, successful takes being recorded in about two-thirds of the cases. Therefore it has been concluded that immunity is lost in about two-thirds of cases within three years. Under these circumstances it might be quite reasonable to inquire into the possible causes of these divergent views and findings by various observers. One would feel inclined to attribute this

possibly to the fact that various factors as regards vaccination and re-vaccination have been considered or accounted for from different points of view.

It is universally admitted that apart from the important factor of individual susceptibility, various others are also to be considered, specially:—(a) Technique and extent of vaccination incisions and vesiculations obtained. (b) The quality and potency of lymph used. It is common knowledge that most of these factors vary to a great extent in various countries. It is a recognized fact that the results and the immunity both in regard to degree and duration is proportional not only to the number and size of incisions made, to the extent and quality of vesicles obtained, but also to the quality and potency of lymphs used. The International Committee on Small-pox and Vaccination of the Health Organization of the League of Nations in their report of August 1928 state:—‘The best lymphs may have the most different results, according to the manner in which they are used. Next to individual susceptibility, one of the most important factors is the vaccination technique’. It might be therefore interesting briefly to discuss some of these factors.

It appears that the findings of various observers are based on the results of the primary vaccinations on infants being judged from the scars seen at the time of re-vaccinations, and the results of these re-vaccinations from vesiculations or reactions. Though it is true that there is a definite relationship between the immunity and the vaccination scars, and these do give a fairly good indication of results of past vaccination, it might also be noted that it is a rather uncertain factor, or at least not an accurate indication. The area of scars measured in a growing child is not always a satisfactory test because it is seen that they increase in size as the child grows. In this connection the following observation might be interesting to note:—

Average vesicular area of four insertions as measured on the eighth day of vaccination = 0.505 square inch or about 315.6 square millimetres.

Scar area of these on the 22nd day after the scabs had fallen off = 0.4421 square inch or about 263.1 square millimetres.

The same scar area at the end of three months = 0.483 square inch or about 301.8 square millimetres.

The same scar area at the end of six months = 0.523 square inch or about 326.8 square millimetres.

It will be seen therefore that a more satisfactory factor for accurately judging the relative results of vaccination, particularly infantile vaccination, would be to evaluate them from their typical ‘takes’ or typical vesicles, and their total area.

Technique, and nature and number of incisions.—As regards the method or technique of

vaccination, it varies considerably not only in various countries but even amongst individual vaccinators and observers. Not only cutaneous but also intracutaneous and subcutaneous methods are used. Everyone seems to adopt his own method, considering that to be the best one. Linear incisions with the ordinary scalpel or other cutting-edge vaccinating lancet is the one generally adopted in Europe. France, Spain, Italy and other countries use for the purpose a sort of nib-like cutting instrument. Force in America uses his drill method, which consists of in applying vaccine lymph to a 2-millimetre circle of derma, exposed by removing the epidermis by means of the rotary motion of a small drill held perpendicularly to the tightly-drawn skin. On the other hand Leake of the United States Public Health Services has adopted ‘acupuncture’ or the multiple puncture method with remarkable success. Both these methods are officially approved and recommended under the New York Regulations. Dudley also used the ‘acupuncture’ method at the Greenwich hospital with excellent results.

Further, it may be noted that, besides technique, both the number and the size of incisions or marks also vary throughout to a great extent. In Canada, the one-mark puncture method is officially recommended and adopted. In England, the Ministry of Health, though it prescribed no special technique or method, till recently insisted that in primary vaccination a total vesiculation area of not less than half a square inch should be aimed at. This standard of a half square inch area of vesiculation which was determined long ago by the Royal Commission on Vaccination, as a necessary requirement of primary vaccination to secure maximum protection, remains unchallenged and its effectiveness is admitted on all sides. But of late, on the recommendations of the Vaccination Committee of 1928, England has adopted the American and Canadian practice of one-mark incision or vaccination. This appears to be a sort of compromise arrived at between vaccinationists and anti-vaccinationists. It is also said to be a device to popularize vaccination by making it as little painful or incommoding as possible, and thus to induce people to resort to voluntary re-vaccinations more readily. Whatever may be the value of this measure it must be admitted that the value of the duration of immunity secured by infantile or primary vaccination is being sacrificed.

Quality and potency of lymph used.—The lymph used is also an equally varying factor. It is known that not only do the process of manufacture and the quality of lymph vary considerably but also the kind. Though calves are the usual vaccinifers, other animals like buffaloes, asses, sheep, etc., are also employed. Neuro-vaccine prepared from the brains of

rabbits is employed in some countries, particularly in Spain. Testicular vaccine may also be used. Vaccine lymphs in several countries are commercialized products. There is no standard of dilution, which may vary from 1 in 3 to 1 in 10. It is evident therefore that not only the quality but also the doses of vaccine virus used for the purpose may vary. It is true that all such lymphs used are expected to pass the prescribed International Standard Test. It is also seen by experiments that lymphs with much greater dilution than 1 in 10 can produce vesiculation, but this does not prove the uniform quality of lymph used in all cases by all observers. On the other hand it has not been possible so far to determine the dose or the optimum quantity of vaccine virus required to secure the desired immunity. It is the ultramicroscopic properties of this vaccine virus that makes the position of vaccination so unique and to a great extent so empirical.

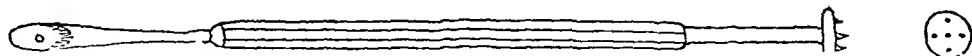
Author's observation

Taking therefore into consideration all the factors discussed above, a careful investigation on the subject was carried out. It covered observations on 1,102 cases of infantile vaccinations and their re-vaccinations at varying periods. But, before stating the results of my findings, it might be of interest to note the factors and exact conditions under which it was carried out. All primary vaccinations were on infants below 12 months of age. The technique used for all vaccinations and re-vaccinations was quite uniform. In all cases (both infantile and re-vaccinations) the number and size of incisions made were absolutely the same:—four incisions in either case and of the same kind and size. All cases selected for re-vaccinations had four good scars and a record of four good vesicles seen on the eighth day of their primary vaccination. All cases were vaccinated with the rotatory vaccinating lancet which was devised and is manufactured at this institute. This lancet is used by all public vaccinators in Bombay Presidency. It is shown in the illustration below:—

is gently pressed and rotated. This results in breaking the skin very superficially in a circular incision 4 millimetres in diameter. The central needle point does not as a rule break the skin. Its main function is to fix the lancet and it, being slightly longer than the peripheral ones, serves to press the skin down and thus stretching it helps to cut it more easily by the latter. It will be seen therefore that in all my cases uniform technique and method was adopted, all incisions being of an absolutely uniform size, unlike perhaps the linear and other ones, the sizes of which are evidently judged only roughly. Further it may be also interesting to note that all my circular incisions of 4 millimetres diameter result in uniform shapes and sizes of circular vesicles between 10 and 11 millimetres in diameter.

Total vesiculation area covered by four such insertions or incisions is on an average just about half a square inch.

As to the lymphs used in all my cases, they were all manufactured in this institute and were of uniform standard of quality, potency and purity. All lymphs prepared in this institute are dermal. Heifers below two years old are the vaccineifers. A solution in distilled water of 50 per cent re-distilled glycerine of a specific gravity of 1.260 is the diluent. Dilution is in proportion of 1 in 5 by weight. Purification of lymphs is by the chloroform vapour method. They are not filtered. All lymphs are tested bacteriologically for their purity. They are also tested for potency according to the recognized international standard tests and also by special tests used in this institute. The lymphs issued from this institute are reported to give nearly a 100 per cent success rate. From the result statements submitted by public vaccinators throughout the whole Bombay Presidency, including Sind, from 763,610 primary vaccinations done by them during the last year, a case success rate of 99.96 per cent and insertion success rate of 99.46 per cent are reported. Also all my vaccinations and re-vaccinations were carried out by the same two vaccinators of this institute. All results of vaccinations



Rotatory vaccinating lancet (actual size), Belgaum Vaccine Institute pattern.

The circular disc end is provided with five tiny conical-shaped needle points; four of these are on the periphery of the disc and one very slightly longer than the others in the centre. The tiny scoop on the other end of the lancet is used for the purpose of placing a drop of lymph on the area to be vaccinated. Through the drop of lymph thus applied on the skin, the disc end of the lancet, held perpendicularly,

were personally seen by the writer and carefully recorded. Primary vaccination results were seen on the eighth day and those of re-vaccinations generally on the sixth day and earlier. There is not much to be said or noted about the primary or infantile vaccination reactions, but the same cannot be said as regards re-vaccinations. The types of reactions of the latter may and do considerably vary from the

former. In the correct interpretation and significance of these, conclusions are to be drawn. The importance of accurate records of re-vaccination reactions therefore is obvious. More or less in accordance with the views expressed on this point by the International Committee on Smallpox and Vaccination of the League of Nations, the results of my cases have been classified as follows:—

Class I.—Definitely unsuccessful.

Class II.—Very slight reaction. Allergic or early, showing just a small papule with very slight or no areola.

Class III.—Accelerated vesicular reaction. Developing earlier than in the primary vaccination type reaction.

Class IV.—Definitely successful. Showing a typical reaction of primary vaccination type as seen on the eighth day after vaccination.

The statement below shows the results, tabulated, for half-yearly periods, of 1,100 cases of children vaccinated when they were infants and the same re-vaccinated at varying intervals, in both cases at this institute and under absolutely identical conditions. From the statement are excluded two cases in view of their exceptional results. They seem to demonstrate forcibly the individual susceptibility factor in vaccination. One child being re-vaccinated within about 10 months was found to show an extraordinarily good reaction of a definite primary type. This child was vaccinated on 7th September, 1932, when five months old and was re-vaccinated on 2nd August, 1933. Results on both occasions were seen to be practically identical. The other child being re-vaccinated within five months was found to

TABLE I

Showing results of re-vaccination at different intervals in children vaccinated in infancy

Interval between infantile vaccination and re-vaccination	Number in group	CLASS I	CLASS II	CLASS III	CLASS IV
		Number definitely unsuccessful	Number of allergic or early papular reactions	Number of accelerated vesicular reactions	Number definitely successful — Primary type
1-6 months	60	48	12	..	..
7-12 "	98	76	22	..	..
13-18 "	101	67	30	4	..
19-24 "	67	38	23	5	1
25-30 "	124	60	39	12	13
31-36 "	91	30	36	14	11
37-42 "	93	26	32	17	18
43-48 "	55	16	22	6	11
49-54 "	95	22	32	14	27
55-60 "	65	18	24	12	11
61-66 "	63	7	18	9	29
67-72 "	62	15	17	10	20
73-78 "	60	10	15	10	25
79-84 "	66	10	15	10	31

show also an exceptionally good reaction of the accelerated type with good vesicles and areola.

From the above figures it will be seen that, though the results obtained give on the whole a fairly definite indication of progressive march one way or the other, at some age periods this is not quite as regular as one would expect. If, however, these same results are grouped together in one-yearly periods, they furnish more intelligible data and enable one to draw some definite conclusions.

TABLE II

Showing results of re-vaccinations at different intervals in children vaccinated in infancy, grouped in one-year time periods and shown as percentages

Interval between infantile vaccination and re-vaccination	Number in group	CLASS I	CLASS II	CLASS III	CLASS IV
		Definitely unsuccessful, per cent	Allergic or early papular reactions, per cent	Accelerated vesicular reactions, per cent	Definitely successful — Primary type, per cent
1 year	158	78.30	21.70	..	..
2 years	168	62.10	31.50	5.85	0.55
3 "	215	41.25	34.95	12.55	11.25
4 "	148	28.75	36.15	15.50	19.60
5 "	160	25.45	34.55	16.10	23.90
6 "	125	17.65	28.05	15.20	39.10
7 "	126	15.95	23.95	15.95	44.15

Class I.—The figures above in this class will show that even within one year only about 78 per cent show definitely unsuccessful results; in seven years this figure gradually dropped to about 16 per cent. This drop, it will be seen, is steady and marked during the first three years, after which it becomes less definite. The possible explanation of this lies in the fact that infantile vaccination is performed in a body of small weight, about 15 to 20 lbs., which is undergoing rapid developmental changes and so the adjustment of immunizing powers which has taken place in the infant fails to meet the demands of the rapidly-growing body and tissues.

Class II.—In these cases there is no vesicle developed but only slight induration and a small papule reaching its maximum reaction between the second and fourth day of re-vaccination. It is only an allergic or papular reaction; it is not a definite indication of loss of immunity. Some observers, like Muller, even go to the extent of suggesting the reaction to be the true evidence of immunity. Anyway, it may be taken as a beginning or the first step of the backward journey on the ladder of vaccination immunity. Except on the first and sixth years the percentage figures of these cases are fairly constant.

Class III.—In this class there was a definite vesicle and some areola but the development of the reaction nearing the primary type was accelerated. It was seen at its height generally between the fifth and sixth day. A small number was found in the second year; this was more than doubled during the third, reached 16 per cent in the fourth year, and remained practically steady at the subsequent age periods. This accelerated reaction is considered by some also as a definite evidence of immunity. This is true to some extent, but I would consider it as a residual immunity in about its last waning stage and affording a poor protection against smallpox.

Class IV.—Apart from one exceptional case, referred to above, it will be noted that a definite though small number of primary type reaction begins to appear even within two years; in the third year it had reached 11 per cent, and kept on steadily and progressively rising every year. At seven years, almost half of the children that had been vaccinated in their infancy were found with no immunity left and so were definitely unprotected against smallpox.

In this connection it is admitted that opinions may differ as regards the interpretation of the above results. Generally, papular and accelerated vesicular reactions are considered by some as immunity reactions. This being so, all the cases under the above classes I, II and III would be put down together as 'immunes', and class IV as 'non-immunes'. If this classification is accepted my results would stand as follows:—

TABLE III

Showing rate of loss of immunity conferred by infantile vaccinations, percentages at different time intervals

Intervals	Immunes, per cent	Non-immunes, per cent
1 year	100.00	..
2 years	99.45	0.55
3 "	88.75	11.25
4 "	80.40	19.60
5 "	76.10	23.90
6 "	60.90	39.10
7 "	55.85	44.15

Though the above classification may be academically correct, I consider it inadvisable to accept it as a safe guide from the practical point of view. There can be no two opinions as regards the significance and the interpretation of results under class I and class IV. These are definite, but between these two extremes are to be found class II and class III. The former is a very slight deviation of class I, and it may be taken as an indication of good immunity, but the latter, though to some extent an indication of immunity reaction, is certainly one on which it would be inadvisable to

rely as a sufficiently effective protection against smallpox. For practical purposes, therefore, I would classify the above results under two categories—class I and class II may be taken together as being within the effective safety margin of protection, and class III and class IV taken together as outside this safety margin. So that there will be one group of cases taken as adequately protected against smallpox and may be considered as 'safe', and the other unprotected or not sufficiently protected and for all purposes to be considered 'unsafe'. This is shown in the table below:—

TABLE IV

Showing rate of loss of immunity conferred by infantile vaccinations, percentages at different time intervals; regrouped to conform with author's views

Intervals	'Safe' (classes I and II), per cent	'Unsafe' (classes III and IV), per cent
1 year	100.00	..
2 years	93.60	6.40
3 "	76.20	23.80
4 "	64.90	35.10
5 "	60.00	40.00
6 "	45.70	54.30
7 "	39.90	60.10

From the above figures it will be evident that more than one-third of the children between the ages of four and five years vaccinated in their infancy are in danger of contracting smallpox; similarly more than half of those at six years and nearly two-thirds at seven years. Practical application of these figures for judging the degree and duration of immunity conferred by infantile vaccination against smallpox is obvious.

Conclusion

It is an admitted fact that vaccination protects not only against smallpox but against itself. It is also known that the degree and duration of immunity conferred by it to be greater against smallpox than against vaccination itself, but, in spite of this fact, for practical purposes it would be advisable to judge the immunity from the re-vaccination results. Considering therefore this question from this angle of view and judging it from the above facts and figures it will be abundantly clear that the degree and duration of immunity conferred by infantile vaccination is certainly much poorer and shorter than is generally believed.

Gins states that about one-fifth of children vaccinated in infancy completely lose their immunity when 12 years old. Sergeant on the other hand found that two-thirds of cases lose their immunity within three years. From my investigation I come to the conclusion that in

(Continued at foot of next page)

SOME OBSERVATIONS ON THE LACTOSE-FERMENTING ORGANISMS ENCOUNTERED IN THE BACTERIOLOGICAL ANALYSIS OF WATER IN THE TROPICS

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A CAREFUL study of *The Bacteriology of Surface Waters in the Tropics* by Clemesha (1912) shows that he mentions 29 of the 42 different species of lactose-fermenting organisms which are tabulated numerically and shown in table XII (a) (after MacConkey, 1909) at the end of that book.

The identification of the organisms contained in MacConkey's table is determined principally by their behaviour in five different sugar media, by the indol and Voges-Proskauer tests and by the presence or absence of motility. With the use of these eight tests it is possible to identify each species separately. Taylor, Martin, Naidu and Naidu (1927) gave an 'Identification table for lactose-fermenting organisms which are citrate non-utilizers or variable' (table XVII). In this table the two sugars, adonite and inulin, and the Voges-Proskauer tests as shown in MacConkey's table are omitted, so that the identification of organisms is determined by means of five tests. The same paper also contains a table showing the 'reactions of organisms isolated from different sources to the citrate, methyl-red and Voges-Proskauer tests'. The Clemesha class to which they belong is also shown (table XVI). [These two tables will, for purposes of convenience, be referred to as table XVI and table XVII.]

Table XVI contains 31 different species of organisms, eight of which, nos. 7, 36, 66, 70, 71, 97, 102 and 109, are not included in the 29 organisms isolated by Clemesha. There are therefore 23 species of organisms isolated by Clemesha and by Taylor and his co-workers. Six species of lactose-fermenting organisms additional to these 23 species have been isolated

(Continued from previous page)

the Bombay Presidency about one-fifth of the children vaccinated in their infancy completely lose their immunity within four years and about one-half in seven years. Therefore the desirability and importance of re-vaccination at an earlier interval or age period than is generally adopted in some places is obvious. Also, apart from the advisability of it being done even within one year in the presence of epidemics of smallpox, I consider it most desirable that besides infantile vaccination re-vaccination of all children as they attain the age of four or five years should be enforced by legislation or otherwise.

by Clemesha alone, and, as already stated, 8 species by Taylor and his associates, making altogether 14 species which have been isolated by one author only. These 14 species, together with 23 species mentioned above, i.e., 37 of the 42 species contained in MacConkey's table, have been isolated from different sources in the tropics.

The six lactose fermenters isolated by Clemesha alone are nos. 3, 6, 9, 33, 37 and 103, and the 23 organisms isolated by Clemesha and also by Taylor and his associates are nos. 1, 2, 4, 5, 8, 34, 35, 65, 67, 68, 69, 72, 73, 74, 75, 98, 100, 101, 104, 105, 106, 107 and 108.

Clemesha has classified 24 of these 29 organisms into three classes, according to their power of resistance to sunlight. He has left five unclassified, viz, nos. 8, 37, 69, 104 and 105.

Of the 23 species isolated by Clemesha and Taylor, 19 have been classified by Clemesha, those unclassified being nos. 8, 69, 104 and 105. The five organisms which have been classified by Clemesha additional to these 19 referred to above are nos. 3, 6, 9, 33 and 103. An analysis of table XVII shows:—

1. Eighteen species of lactose-fermenting organisms.

2. That of these 18, twelve—nos. 1, 2, 4, 5, 8, 34, 35, 72, 74, 100, 106 and 107—are included among the 23 organisms which have been isolated by the authors of both publications.

3. That, of these twelve, eleven have been classified by Clemesha, no. 8 being omitted.

4. That three organisms—nos. 69, 104 and 105—included in the group of 23 species referred to, and unclassified by Clemesha, are excluded.

5. That eight species, nos. 65, 67, 67, 73, 75, 98, 101 and 108, classified by Clemesha are also excluded.

6. That six of the eight organisms, nos. 7, 36, 66, 71, 97 and 109, already referred to are included, nos. 70 and 102 being omitted.

7. That all the organisms contained in this table give a negative Voges-Proskauer reaction with the exception of B. 97.

The water bacteriologist on completion of certain tests must refer to a table to enable him to identify the organisms isolated and has the choice amongst others of MacConkey's table or table XVII. The use of the former is advantageous in that it has a very much wider selection of organisms but the necessity of having to perform eight different tests is a disadvantage. The use of table XVII is very convenient since only five tests are necessary. The number of species of organisms contained in this table is, however, limited to eighteen and it will be noticed that, in spite of the reduction in the number of organisms, instances occur where two or even three species are grouped together and not identified singly.

For purposes of record and study of results of water examinations, it is desirable that the

organisms isolated should as far as possible be individually identified and identification in groups avoided, especially when organisms belonging to the different classes (Clemesha) occur in the same group. In order to obtain individual identification, it follows that additional tests must of necessity be carried out.

References have been made to—

(1) MacConkey's identification table.

(2) Table XVI showing 'Reaction of organisms isolated from different sources to the citrate, methyl-red and Voges-Proskauer tests'.

(3) Table XVII—'Identification table for lactose-fermenting organisms which are citrate non-utilizers or variable'.

(4) Class of organisms (Clemesha) which is also shown in table XVI.

The laboratory worker, it will be seen, is obliged to refer to different tables relating to identification, the reaction to the citrate, methyl-red and Voges-Proskauer tests and class of lactose-fermenting organisms. Undoubtedly the preparation of one table embodying the tests required for purposes of individual identification and showing the reactions to the citrate test, also the class to which they belong of certain of the more important and the more frequently encountered organisms, would be of great convenience, in that it would obviate the necessity of having to refer to different tables. The preparation of such a table however calls for careful consideration with regard to the two points, *i.e.*, the number of organisms to be included, and the number of tests required to separate satisfactorily organisms one from another with a view to individual identification.

With regard to the number of organisms to be included, since the table is required for purposes of reference in connection with routine analysis, the inclusion only of organisms most frequently found forming the bacterial population of water appears necessary along with the important species whose presence in water is significant of undesirable pollution. To avoid overcrowding and group identification, the number of organisms must necessarily be limited.

For purposes of convenience it appears necessary to consider firstly the species of lactose-fermenting organisms, which, on account of their rarity and apparent insignificance, can conveniently be omitted from the table under consideration.

In my opinion there are 11 such organisms and these are divided into three groups according to the justification for their exclusion:—

Group I.—Nos. 10, 38, 39, 99 and 110. These species have not been isolated by either Clemesha or Taylor, and on account of their rarity their inclusion does not appear to be necessary.

Group II.—Nos. 69, 104 and 105. These three species are included among the organisms shown as having been isolated by the authors of both publications. Their omission from my proposed table appears reasonable on account of the fact that they have not been classified by Clemesha nor have they been included in table XVII.

Group III.—Nos. 70, 102 and 37. The first two species are included among the 8 species of organisms already referred to as having been isolated by Taylor, and are the only two of the eight not included in table XVII. As for no. 37, this organism was isolated on one occasion by Clemesha from a sample collected from the bottom of a lake. It may accordingly be regarded as a rare finding. For these reasons these three organisms are omitted.

Excluding nos. 70, 102 and 37 referred to above, eleven species have been mentioned in one publication only, *viz.* nos. 3, 6, 9, 33, 103 (Clemesha), and nos. 7, 36, 66, 71, 97, 109 (table XVI). The importance of these eleven species lies in the fact that Clemesha has classified those isolated by him and the remaining six are shown in table XVII.

A study of these species shows:—

Nos. 3 and 33.—These two species have not been encountered in water. Clemesha isolated them from faeces in Madras and Brahmachari and Sen (1933) have done so in Bengal. Nevertheless, they are considered rare and may be excluded from the proposed table.

Nos. 6 and 9.—These two species have been isolated in Madras from lake water. The former is shown as forming a low percentage of organisms in lake waters in table IX (b) of Clemesha's book recording 'percentage of organisms in lake waters'.

The latter was isolated by Clemesha at one period of the year only, *viz.* in the 'quarter ending March'. Since they have not been isolated from any source in Burma, nor from faeces in Bengal (Brahmachari and Sen, 1933) their presence in water may justifiably be considered as an uncommon finding. These two species are excluded for these reasons.

Nos. 7 and 109.—These two species are identified together in table XVII and in MacConkey's table XII (a) with the application of eight tests it will be noticed that the reactions of the two organisms are exactly similar. To attain individual identification it is necessary to tabulate the more important of these two organisms, *i.e.*, no. 7 which belongs to group 3 (table XVI) and is usually found to be citrate —ive, no. 109 being placed in group 4 with usually a citrate + result.

B. grunthal and no. 106.—These two species are also identified together in table XVII along with no. 1. The reactions of these two organisms in MacConkey's table are not differentiated when the eight tests are used and on this

TABLE

		Lactose	Saccharose	Dulcite	Adonite	Tudol	Motility	V. P. test	Citrate	Group	Clemesha class	
1.	..	+	-	-	+	+	+	-	-	1	II	Group 1 always citrate -
2.	<i>B. acidi lactici</i>	+	-	-	+	+	+	-	-	5	II	Group 2 always citrate +
4.	<i>B. grunthal</i>	+	-	-	+	+	+	-	..	3	III	..
5.	<i>B. vesiculosus</i>	+	-	-	-	+	+	-	..	3	III	..
7.	..	+	-	-	-	-	+	-	..	3	III	Group 3 variable, usually citrate -
8.	<i>B. coli mutabilis</i>	+	-	-	-	-	-	+	..	1	..	..
103.	<i>B. lactis aerogenes</i>	+	-	-	+	-	-	+	..	1	II	Group 4 variable, usually citrate +
108.	<i>B. cloacæ</i>	+	-	-	-	+	+	+	+	2	III	..
31.	<i>B. coli communis</i>	+	-	+	-	+	+	-	-	1	I	Group 5 equally often citrate - or +.
35.	<i>B. schafferi</i>	+	-	+	-	+	-	-	-	1	I	..
36.	..	+	-	+	-	+	-	-	-	1	I	..
65.	<i>B. oryctolus perniciosus</i>	+	+	+	+	+	-	+	+	2	I	..
66.	..	+	+	+	+	+	-	+	+	5	..	..
67.	..	+	+	+	+	-	-	+	+	2	II	..
68.	<i>B. pneumoniae</i> (friedlander)	+	+	+	+	-	-	-	+	2	II	Class I. Susceptible organisms associated with recent and undesirable pollution.
71.	<i>B. rhinoscleroma</i>	+	+	+	-	+	+	-	..	3	..	..
72.	<i>B. neapolitanus</i>	+	+	+	-	+	-	-	..	3	II	..
73.	..	+	+	+	-	-	+	+	+	2	II	Class II. Medium resistant sunlight.
74.	..	+	+	+	-	-	+	-	..	4	II	..
75.	..	+	+	+	-	-	+	-	..	2	II	..
97.	..	+	+	-	+	+	-	+	+	1	I	Class III. Resistant.
98.	..	+	+	-	+	-	-	+	+	2	I	..
100.	..	+	+	-	+	+	-	-	-	1	II	..
101.	..	+	+	-	+	+	-	-	+	2	II	..
107.	<i>B. coscoroba</i>	+	+	-	-	+	-	-	..	4	II	..

account it is necessary to omit one of the two. Regarding no. 106 Clemesha states 'next to the *grunthal* group this organism was found to be the commonest in the faeces of man and animals'. He further remarks, 'It is doubtful if this bacterium should not be in class III'. The significance of these two organisms when found in water, both being resistant types, is more or less similar and since of the two *B. grunthal* is the more common it has been tabulated.

In all therefore I suggest that 17 species be excluded from the proposed table. There remains therefore 25 species which appear to be the organisms most likely to be encountered in the routine analysis of water. These include—

(a) Nineteen of the twenty-three species isolated both by Clemesha and by Taylor and his associates, those excluded being nos. 69, 104, 105 and 106.

(b) Twenty of the twenty-four species which have been classified by Clemesha, those omitted being nos. 3, 6, 9 and 33.

(c) Six of the six species which always give the formula — + — with the three tests,

citrate, methyl-red and Voges-Proskauer, i.e., *B. coli communis*, *B. schafferi*, no. 36, *B. coli mutabilis*, no. 97 and no. 100 (Taylor, Martin, Naidu and Naidu, 1927).

(d) Twelve of the fourteen faecal bacteria which are common to Madras and Bengal Provinces, those omitted being the rarer species nos. 3 and 33 (Brahmachari and Sen, 1933). Eleven of these twelve are common to Madras, Bengal and Burma Provinces, no. 103 being untabulated in table XVI.

The number of tests required

As already stated, eight tests as shown in MacConkey's table are sufficient to enable individual identification of an organism being made. With the use of five tests as shown in table XVII it is possible to tabulate singly the following eight bacteria:—

No. 7, *B. coli communis*, no. 36, *B. schafferi*, no. 71, no. 98, no. 100 and no. 108, the remaining 17 being identified in groups of two and three as follows:—

Nos. (1, 4), (2, 5), (8, 103), (65, 66, 72), (67, 68, 75), (73, 74), and (101, 97, *B. coscoroba*).

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FUMIGATION AND TRAPPING OF MOSQUITOES

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Owing perhaps to the unsatisfactory results of fumigation and spraying, measures for

(Continued from previous page)

It is very desirable that the examination should, in addition to identifying the particular organism, also afford information as to its origin, whether faecal or otherwise. In these tests, citrate, methyl-red and Voges-Proskauer are commonly used for this purpose; but the Voges-Proskauer test has an additional value for it makes possible the immediate identification of seven of the 17 remaining species referred to above.

These seven are—

B. coli mutabilis, nos. 65, 68, 73, 74, 97 and 103.

There therefore remain ten organisms which it is not possible to identify singly by means of six tests, viz, nos. (1, 4), (2, 5), (66, 72), (67, 75), and (101, 107).

In order to differentiate one from another the two organisms comprising each of the above pairs, it will be found that by the use of adonite as an additional sugar test this differentiation can satisfactorily be made, the first-mentioned organisms of each pair being adonite + and the second adonite —ive. The use of this sugar test also further differentiates *B. coli mutabilis* and no. 103.

It will be seen, therefore, that by the addition of one test to those shown in table XVII, 25 species of lactose-fermenting organisms which are most likely to be encountered in the bacteriological analysis of water in the tropics can be tabulated with their reactions, and identified singly, as a result of which it is possible to record the class (Clemesha), and the citrate group (table XVI) to which each belongs.

For facility of reference the organisms tabulated have been divided into MacConkey's four groups according as they do or do not ferment saccharose and dulcitate.

I am obliged to the Director of Public Health, Burma, for permission to publish this article.

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dealing with the adult mosquito in anti-malarial work have tended to become more defensive than offensive.

The War Office report on the health of the army for the year 1931, page 111, under the heading anti-malarial measures reads as follows :—

'Fumigation and spraying are expensive measures of doubtful value. The former has been entirely abandoned.....'

While anti-mosquito must always be subsidiary to anti-larval measures, any supplementary means of destroying the adult insect if practicable is worthy of consideration. The latter gains in importance where the existence of extensive breeding grounds that are not under control, military or otherwise, interferes with efficient anti-larval control.

The method of trapping mosquitoes about to be described first suggested itself on noting the stampede of these insects through open doors and windows when pyrethrum was burnt in a room. It depends on the fact that mosquitoes so disturbed will fly towards light in an attempt to escape from irritating fumes.

A demonstration on these lines was given at Bannu in 1933 but only continued spasmodically. This year however a sharp epidemic of malaria at Wana which has an early malaria season raised the question as to whether Bannu would be similarly affected and it was decided to give the fumigation-trapping method a trial.

Large scale operations are in a comparatively early stage and it was only found possible to carry them out extensively from the beginning of October since when most barracks have been trapped daily.

After some experiments the trap described below was designed and taken to Bannu for trial. Over eighty of these are now in use and meet with considerable success.

The trap.—This is constructed by sewing a diaphragm of black cloth about six feet square at right angles over the open end of a *mul-mul* bag six feet long and twenty-four inches in diameter. An aperture of suitable size about 6 to 8 inches in diameter is cut in the black diaphragm and leads into the bag.

The trap is set by stretching the diaphragm on the wall inside a window by means of tapes and nails and leading the bag out through the window where it is attached to posts in the verandah or other available support. The cost per trap is Rs. 3.

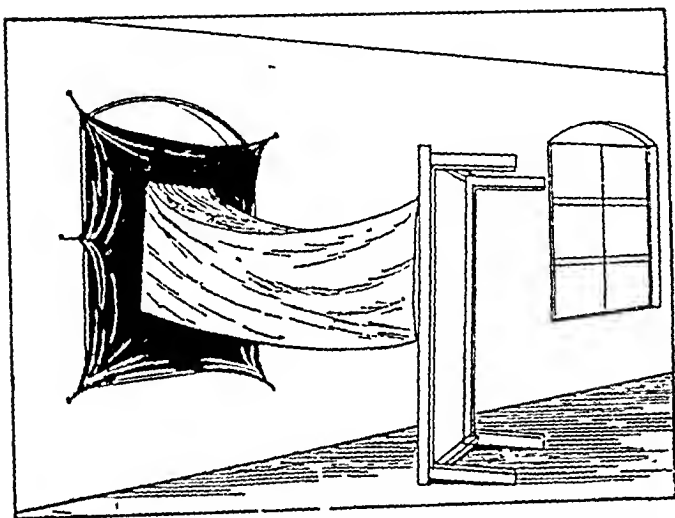
Fumigants.—A very close comparison has been made of several fumigants the criterion being the number of mosquitoes trapped—cresol, sulphur, neem leaves, pellitory root and pyrethrum have been vaporized or burnt.

The latter, preferably in the form of one of the proprietary mosquito coils, has been found very much more efficient than anything else.

Three inches of such a coil (Katol is used in the present instance) will clear a barrack of over 10,000 cubic feet in half an hour at a cost of about a farthing. It is extremely simple to use, there is no danger of fire or of damage to metal or fabrics. The cost of fumigant per regimental unit approximates Rs. 20 per month.

Method of use.—The drill for de-infestation is as follows:—

All windows and doors except the one to be trapped which should not be on the sunlit side of the building are closed and curtained. The only light should be that through the hole in the diaphragm. Darkening and sealing barracks by means of blankets is not easy and unless care is taken mosquitoes escape through any lighted chink.



In actual practice it is far better to attach the black cloth inside the window frame and to lead the *mul-mul* bag out through the window. But it was difficult to show this in a single sketch.

The trap is set and a label placed inside it giving the name of the unit and the number of the barrack. One or two coils are lit and placed in that part of the barrack furthest from the trap. After half an hour the trap opening is tied and the traps rolled up and collected. They are chloroformed at the laboratory and the catches shaken out on to a white sheet, counted and identified. Besides mosquitoes myriads of small insects including sandflies are frequently caught and occasionally house-flies, wasps and hornets. Nets should never be fitted or sprayed and should be thoroughly aired after use.

Results.—The value of any individual anti-malarial measure is extremely difficult to determine. The number of factors involved are so many that the figures appended are only to be regarded as statements from which no conclusion can fairly be drawn. To lend force to this it is only necessary to quote the malaria admissions at Bannu for the last four years during the peak months, October and November.

Ratio per mille

	1930.	1931.	1932.	1933.
October ..	9.5	32.06	63.97	90.19
November ..	22.2	43.32	126.77	123.03

Anti-malarial measures during these years were presumably identical. The position of various lines, previous malarial history of a unit, etc., all contribute to the difficulty.

This article does not indeed set out to prove the value of fumigation-trapping in reducing malarial incidence as the results given may be purely fortuitous; what it does do however is to indicate an easy, cheap and practical way of reducing the numbers of mosquitoes and sandflies, both carriers of diseases in dwelling places in which infection is most likely to occur.

Trapping commenced on 21st September on a small scale with only a few traps. Later on, all barracks were trapped daily.

Typical counts are: *Culex* sp.—16, *Anopheles subpictus*—30, *A. stephensi*—48, *A. culicifacies*—16, and *A. listoni*—4.

More mosquitoes appear to enter barracks during the day than at night, judging by morning and evening netting, and no one species accounts for this.

The numbers caught week by week and the malarial incidence (out of an approximate total strength of 2,180) in trapped barracks are as follows:—

Week ending	<i>Culex</i>	<i>Anopheles</i>	Malaria cases
September 7th	..	..	11
14th	..	..	25
21st	..	..	36
28th	312	1,163	18
October 5th	261	1,842	17
12th	199	1,381	19
19th	283	1,257	13
26th	315	1,919	14
31st	479	2,004	10
November 7th	927	1,989	12
14th	1,488	2,034	20
21st	760	885	8
28th	451	463	14
December 5th	33	34	10

A total of about 15,000 anophelines were caught of which perhaps two-thirds were carrier species.

In conclusion I have to acknowledge the help of Captain B. T. Griffiths, I.M.S., the anti-malarial officer, Bannu, on whom the brunt of the work had fallen, and of his assistant, Jemadar Charan Singh, I.M.D.

A Mirror of Hospital Practice

A CASE OF MYELOCYTIC LEUKÆMIA WITH COMPLICATIONS

By F. McCAY, M.A., M.D. (Cantab.)

and

S. NAIRN, M.B., Ch.B., F.R.C.S. (Edin.)

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A FRAIL unhealthy little Chinese boy of fourteen was admitted to the Presidency General Hospital, Calcutta, on the 28th of March, 1931, with a four-months' history of fever and general weakness.

The fever was irregular, ranged from 97°F. to 104°F. and persisted for five months after his admission. The pulse rate rose with the temperature but was regular. On examination it was found that the liver extended to three inches below the costal margin and that the spleen was enlarged to the umbilicus. The blood picture on admission was:—

Hæmoglobin—55 per cent.

Red corpuscles—2,500,000.

White corpuscles—40,000.

Myelocytes—12 per cent.

The fundi showed typical leukæmic changes. The serum tests for kala-azar and the Wassermann reaction were negative. A trace of albumin was present in the urine. Nothing abnormal was discovered in the stools.

There were signs of fibrosis, but not of active tuberculous disease in the upper lobe of the right lung and there was pain and limitation of all movements at the left hip joint. An x-ray picture showed early tuberculous changes in the upper part of the acetabulum and head of the femur.

The left leg was rested in a Thomas' splint with the thigh slightly flexed and abducted but with no extension on account of the pain experienced. Pathological dislocation upwards suddenly occurred after two months in hospital. The dislocation was reduced under a general anæsthetic of ethyl chloride followed by open ether but the femur slipped up again directly the almost unbearable, but necessary, extension of 40 pounds was lessened. Finally, all extension was removed and the limb just supported as before. Later, both wrist joints became swollen and painful to move, but no actual bony changes could be detected by x-ray.

After the fifth month the various tuberculous processes and the fever settled down and the patient's general condition improved considerably—especially his appetite. He began to get about on a wheeled chair and to move his left leg which was now three inches shorter than the right; he also began to put on

weight steadily. Unfortunately during his sixth month in hospital he developed keratitis but this cleared up quickly under local treatment with cod-liver oil. Again in his seventh month his progress was held up by a Brodie's abscess developing in the right tibia and this had to be opened and scraped out under a second general anæsthetic.

Meanwhile his spleen had slowly increased in size and his blood picture, in spite of treatment with numerous drugs, had become:—

Hæmoglobin—55 per cent.

Red corpuscles—3,000,000.

White corpuscles—234,000.

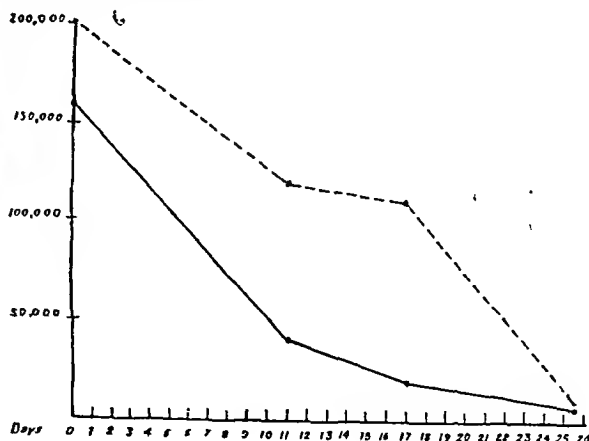
Myelocytes—40 per cent.

Deep x-ray therapy to the spleen and long bones from varying angles was now started and continued until the white blood count had come down to within normal limits. By this time his spleen had shrunk considerably and its margin could be felt two inches above the umbilicus.

Exposures of 3 milliamperes were given at a tension of 180 kilovolts screened with 0.5 mm. copper at an anode-skin distance of 13 inches on approximately alternate days. There was considerable reaction to the first exposure of ten minutes so the remaining ten exposures were reduced to five minutes each and caused no general bad effects. The blood changes brought about by this deep x-ray therapy course are shown in the accompanying graph.

Leucocytes per c.mm. —————

Myelocyte percentage $\times 10,000$ - - - - -



When he had been in hospital for nearly a year—his parents and relations had deserted him completely—a vague fluctuating swelling appeared in the region of the displaced head of the femur and pain was experienced on moving the leg but there was no rise in temperature. Ten c.cm. and later another 40 c.cm. of blood-stained sterile serous fluid, in which leucocytes predominated, were aspirated and he soon managed to resume his hobbling about

on crutches. Two months later the swelling reappeared and was this time incised under a general anæsthetic and two sequestra removed. In the 20th month a further course of deep x-ray therapy was given as his leucocyte had risen to 200,000 per c.mm. and his spleen was again well across the mid-line. The count came down as before to within normal limits and he actually got well enough to leave hospital and go to a convalescent home for three months.

He then had to return to hospital with fever, caused this time by a *Bacterium coli communis* infection of his urinary tract. This cleared up quickly with hexamine and an autogenous vaccine course and he went back again to the convalescent home. Finally he was readmitted to hospital with high fever two and a half years after the date of his first arrival.

His spleen extended three inches across the mid-line once more and his leucocyte count was up to 480,000 per c.mm. with 54 per cent myelocytes. Broncho-pneumonia set in and he passed away after two days. Post mortem the spleen was found to weigh 18 lbs.—which in this country where so few post-mortem examinations are performed is probably a record. The case is also interesting for the tremendous resistance shown by this child to such severe diseases with so many serious complications.

A CASE OF ENCEPHALITIS PERIAXIALIS

(SCHILDER'S SYNDROME)

By H. STOTT, M.D., F.R.C.P.

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Physician, King George's Hospital
and

G. L. SHARMA, M.B., B.S.

Demonstrator in Pathology

ENCEPHALITIS PERIAXIALIS (Schilder's disease) is rare. So far as we are aware no case has yet been reported in India.

History of the case

On the 6th October, 1934, J. A., a Mohammedan boy of 8 years, a resident of Allahabad, was admitted to King George's Medical College Hospital, Lucknow, for :—

- (1) Mental dullness—6 weeks.
- (2) Loss of hearing in both ears—6 weeks.
- (3) Loss of sight in both eyes—6 weeks.
- (4) Loss of speech—2 weeks.
- (5) Involuntary movements of the hands and feet—2 weeks.
- (6) Spasticity of both lower limbs—2 weeks.
- (7) Dribbling of urine and constipation—2 weeks.
- (8) Difficulty in swallowing—15 days.

His father stated that he himself had suffered from gonorrhœa sixteen years previously and from syphilis twelve years previously but that his son had not been ill until six weeks ago when he complained of severe headache and became unconscious. During the first two hours of the coma some involuntary movements of the face, hands and feet were noticed. His abdomen became distended and he passed a motion in

bed with much flatus, which relieved the distension. He vomited once and remained unconscious for three days, without taking food and without passing any motion. After these three days he asked for food and spoke frequently. But he remained completely deaf. This condition continued for a month when fifteen days before admission he became unable to speak. Involuntary movements in the limbs now appeared. Urine was passed in small quantities every hour or so and the bowels were never moved without a purgative. Seven days before admission the father noticed that the patient had increasing difficulty in swallowing.

Condition on admission

The young patient lies quietly in bed on one side, for the most part drowsy or asleep. He is not anæmic, nor emaciated. He does not speak, weep, cry or laugh. He cannot hear in either ear when spoken to. Vision in both eyes is lost. His eyes do not blink when a hand is waved suddenly before them. Apparently he cannot comprehend his surroundings and appears to exist without consciousness and without intelligence.

Nervous system

The pupil reacted to light. There was no squint. The eyes appeared to move freely in all directions. Both optic disc margins were blurred; this was probably due to œdema from the cerebral swelling and increased intracranial pressure. The blurring was more marked in the left disc. The lower limbs were spastic with brisk knee and ankle jerks. Babinski's reflex was present on both sides. The upper limbs were normal. Sensory functions could not be tested satisfactorily because of the patient's mental condition. Difficulty in swallowing food was noticed. Urine was passed in the bed in small quantities every hour or so. The patient will frequently abruptly throw his legs and hands in any direction. These movements appear more marked on his right side. The right hand is often placed over the right temporal region as though some trouble existed there.

Reports on blood and cerebro-spinal fluid

On the 8th October the polymorphonuclears were 60 per cent, the lymphocytes 33 per cent, the large mononuclears 5 per cent and eosinophils 2 per cent. No malaria parasites were detected. The Wassermann reaction was completely negative.

The cerebro-spinal fluid was under distinct pressure, and two test tubes, or about 40 c.cm., were drawn off before the fluid flowed at normal rate. The removal of this fluid did not result in any clinical improvement. The total cell count numbered 5 per c.mm. and these were mainly lymphocytes. The albumin was 0.025 per cent and the chlorides 0.74 per cent.

Diagnosis

A sequence of the development of the following symptoms in children or in young adults is pathognomonic—

1. Progressive bilateral cerebral blindness.
2. Progressive bilateral deafness.
3. Progressive bilateral ataxy.
4. Progressive spastic paralysis.
5. Progressive mental deterioration.

Differential diagnosis

(1) *Disseminated sclerosis*.—Schilder's disease has been described as 'disseminated sclerosis in childhood' because of the scattered lesions and of the obvious demyelination. But the lesions in Schilder's disease are massive as shown by the symptomatology and by the naked-eye post-mortem appearance whilst the

spread of these lesions clinically from one part of the brain to another is rapid. Moreover the brain is selected and the spinal cord is usually spared. Encephalitis periaxialis affects children mainly, and its symptomatology is pathognomonic and distinctive from that of disseminated sclerosis.

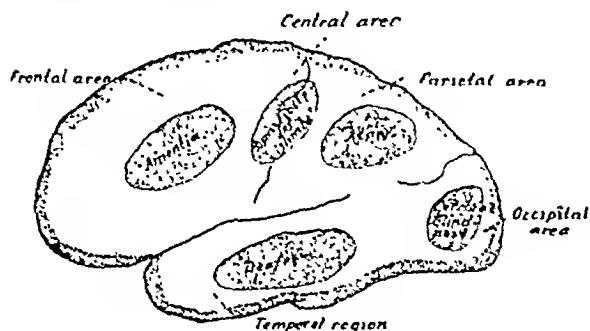


Diagram showing the areas of massive macroscopic gelatinization and microscopic demyelination in the white centres of the cerebral hemispheres, which in the case quoted started (1) symmetrically in both frontal centres (with the production of amentia) and (2) symmetrically in both temporal centres (with the production of bilateral deafness), and progressing to (3) both occipital centres (with the production of bilateral cerebral blindness), (4) whilst it spread after a month to both parietal centres (with the production of bilateral ataxy) and (5) to central area (with the production of bilateral spasticity of lower limbs). A more frequent manner of spread through the white centres is from the occipital lobes forward. The surface and section of the cortical grey matter is normal.

(2) *Hyperkinetic type of encephalitis lethargica* is also characterized by spontaneous involuntary movements, restlessness, and mental symptoms. The absence of ophthalmoplegias in Schilder's disease and the presence of the pathognomonic signs is important in differentiating the two conditions.

(3) *Intracranial tumour* may be simulated when headache, vomiting, papilloedema, and perhaps fits, are present, but the absence of optic neuritis with the presence of severe loss of vision and with the signs of an extensive rapidly-spreading disease of the cerebral hemispheres point to Schilder's disease.

AN UNUSUAL CASE OF JAUNDICE ASSOCIATED WITH HODGKIN'S DISEASE

By G. T. BURKE, M.D., F.R.C.P. (Lond.)

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Department of Medicine

and

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K. A., Mohammedan male, aged 30, admitted to hospital 19th November, 1934, with fever, general pains, cough and jaundice.

There was no past history of any significance.

Present illness.—Some twenty-five days previously he experienced a chill, followed by fever and cough

with expectoration and general body pain. About fourteen days ago he noticed jaundice and dark coloration of his urine, succeeded by epigastric pain and constipation.

Condition on admission.—Well made and nutrition good. Appetite good. Deep icteric colour; temperature 101°F., pulse normal, no respiratory symptoms.

Abdomen: upper part full; epigastric tenderness; liver enlarged, tender, smooth, and firm, extending from the fourth intercostal space to three finger-breadths below the costal margin.

Spleen: enlarged, smooth, and firm like an old malarial spleen, and extending four finger-breadths below the costal margin though patient said he had only noticed it recently. No ascites and no palpable abdominal glands.

Chest: no cardiovascular abnormality. Lungs normal except for signs of congestion at the right base. Sputum scanty and mucopurulent, with, on the second day, a small piece of rusty brown material, which showed many pneumococci.

Urine: dark, containing bile salts and pigment.

Stools: clay-coloured at first, but after saline purgative showing some bile; no parasitic infection.

Blood: Van den Bergh's reaction, immediate, direct, strongly positive, total white count, 1,600 only, with 80 per cent polymorphonuclears and 20 per cent lymphocytes. This was repeated the next day with result, 1,760, 76 per cent polymorphonuclears and 24 per cent lymphocytes.

22nd November. Wassermann reaction of blood, strongly positive.

23rd November. Tests for kala-azar, negative.

24th November. Total erythrocytes, 3,500,000; haemoglobin 60 per cent, white count 2,400, with 70 per cent polymorphonuclears, 28 per cent lymphocytes, and 2 per cent eosinophils.

Progress.—Fever remained at 100°F. to 101°F. daily, but patient's general condition was good; four daily injections of one grain of emetine hydrochloride were given with no effect on the temperature or on the size or tenderness of the liver. His main complaint was that he was not given enough food. Jaundice remained unchanged, with light bile-coloration of the stools.

In the night of 25th November, 1934, he complained of vague discomfort, but did not look worse. About daybreak on the 26th he suddenly got out of bed and, before the nurse could reach him, fell in a fit, and expired almost before the house physician could arrive.

No post-mortem examination could be obtained, except that the liver was taken out, and an interesting condition was found.

Liver enlarged; weight 4 pounds. Greenish colour; on cutting, bile stained, with dilated portal veins; microscopically nutmeg condition with scattered bile pigment: liver cells around portal canal almost disappeared. Some proliferation of bile ducts and some pericholangitis. An infiltration around the portal canal and between the adjacent cells, consisting of lymphocytes and a few enlarged endothelial cells, some of the latter being multi-nucleated. At places there were isolated collections of such cells in the liver substance. The appearance was that of early Hodgkin's disease of the liver.

At the neck of the gall-bladder was an enlarged lymph gland which, on cutting, showed no necrosis nor degeneration, and microscopically was found to be a typical Hodgkin's gland without much fibrosis.

Comment.—The patient undoubtedly suffered from Hodgkin's disease, though there were no demonstrable enlarged glands during life. The diagnosis during life remained obscure, with syphilis as the most probable cause of the jaundice. The extreme leucopenia was not explained. In view of such an incomplete

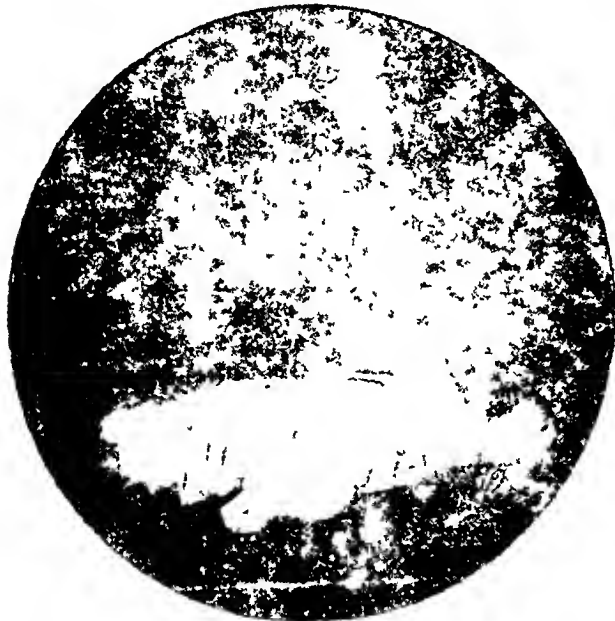
post-mortem examination the presumption is that he had abdominal Hodgkin's disease, with some metastasis near the common bile duct giving rise to obstructive jaundice. The necrosis of the liver cells could be explained by the obstruction of the bile flow and the infiltration found in Hodgkin's disease.

FŒTUS PAPYRACEUS

By E. PATTON

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A MULTIPARA VI, with a history of the first four births normal and the fifth an abortion, was admitted



into hospital on the 17th of April. She was said to be full term and was having slight pains.



Examination revealed a full-term uterus and the child was presenting in the left anterior sacral position.

The patient was delivered about two and a half days later of a healthy female child weighing four and three-quarter pounds.

About three-quarters of the placenta appeared normal but the remainder was hard and pale. Two soft masses were found imbedded on the amniotic surface of the membranes. These were opened and each was found to contain a foetus corresponding in size to a three and a half months' pregnancy with the umbilical cords attached to the hard portion of the placenta.

Pregnancy was normal except for slight hæmorrhage lasting three days during the seventh month and an attack of malaria in the eighth month.

I wish to thank Dr. S. Subha Roe for permission to publish these notes.

A CASE OF PELLAGRA

By S. N. GUPTA, M.B., B.S.

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HIRA DEVI, aged 20, Hindu female, an orphan of the Hindu Orphanage, Rani Road, Lahore, was admitted on the 25th April, 1934, to the Female medical ward of the Mayo Hospital, Lahore, with the provisional diagnosis 'Pigmentation'.

History.—Her parents died when she was only two years old, and she was brought up by a woman friend of the family. She had been living with that woman at Rawalpindi till one and a half years ago when she was sent to the Rani Road orphanage for education. She says she has never lived on maize, her chief diet being wheat, fruits, vegetables, and a sufficient amount of ghee. She gave a history of attacks of unconsciousness (most probably hysterical), which started when she was sixteen years old, but she has had no such attacks for the last six months.

The present complaint started some eight months ago. The first thing she felt was weakness and loss of colour: menstruation became scanty, and ultimately stopped altogether six months ago.

The next complaint was pigmentation; it appeared first on the dorsum of the hands and then gradually spread. She says that the colour was not lighter or reddish brown at first but that it was dark from the very beginning. There was no itching or pain over the pigmented areas.

The diarrhoea started about a fortnight after the pigmentation. It was of a non-fatty type with colicky pain occurring at all hours and was a persistent symptom.

Weakness has gradually increased and with it oedema of the feet has appeared.

She had tried treatment of various ayurvedic and allopathic physicians, but the symptoms had persisted in spite of all this. The patient could not tell much of her past history.

PHYSICAL EXAMINATION

General.—The patient is well developed, not much wasted, but very anæmic. While in the ward, she ran an irregular intermittent pyrexia, the highest temperature being 101°F. As has been mentioned before, there was oedema of the feet and ankles.

Alimentary system.—Subjective symptoms:—Appetite is very poor, no vomiting, no eructations nor flatulence. Bowels open six to seven times during the twenty-four hours, fluid stools, no blood nor slime, no tenesmus, the stools are not fatty. Colicky pains complained of all over abdomen. No jaundice, no piles, no hæmatemesis.

Physical examination :—

Teeth .. normal;
Gums .. very pale;
Tongue .. dark pigmentation over edges and tip, at other places very pale, flabby, movements normal;
Stomach .. nothing abnormal detected on palpation and percussion; fractional test meal examination showed complete lack of free hydrochloric acid and a low total acidity;
Intestines .. examination of faeces showed no amœbæ, cysts or ova; the cellular content was low, liver and gall-bladder normal, spleen slightly enlarged.

Circulatory system.—Subjective symptoms :—Dyspnoea and palpitation on slight exertion, œdema of the feet, no precordial pain or distress.

Pulse rate 98 per minute, regular, vessel walls not thickened, volume small, force and tension normal, no abnormality as regards rise, maintenance and fall of pressure.

Examination of precordia.—Inspection :—Apex beat visible in the fifth space, just a shade outside the mid-clavicular line; no pulsation seen in epigastrium or neck.

Percussion :—

Upper border—at the level of second intercostal space.

Right border—just at the lateral border of sternum.

Left border—a little external to the mid-clavicular line.

Auscultation.—No abnormality in the intensity or spacing of the heart beat. A soft systolic murmur localized in the pulmonary area. A well-marked bruit-de-diabie present over right jugular vein.

Blood pressure was 115 to 80 mm. of mercury.

Blood.—Total white blood corpuscles 6,000 per c.mm. with different varieties of cells in normal proportions.

Total red blood corpuscles 1,250,000 per c.mm.

Hæmoglobin—25 per cent.

Colour index—1/1.

Poikilocytes present, but no nucleated red corpuscles were found, no anisocytosis.

Respiratory system.—Subjective phenomena :—Slight dry cough, no expectoration, no pain in chest, dyspnoea only on exertion.

Physical examination of chest :—No abnormality detected.

Urinary organs.—Normal. The urine report shows no abnormality except the presence of albumin in traces.

Skin.—Dark pigmentation over dorsum of hands and feet extending to the distal third of forearms and legs, backs of elbow joints, bridge of nose and adjoining portions of cheeks, and back of neck. Distribution of pigmentation is bilateral and symmetrical. In the pigmented areas, skin is dry and thickened.

Nervous system.—Intellectual functions :—The patient is always depressed and irritable, does not like to talk, otherwise no abnormality.

No other abnormality in other nervous functions.

Wassermann reaction.—Negative.

Diagnosis.—The condition was diagnosed as pellagra by the visiting physician on the following grounds :—

- The typical skin lesions with their symmetrical distribution over the exposed parts of the body,
- the non-fatty type of persistent diarrhoea,
- presence of mental irritability and depression,
- irregular pyrexia, and
- history of living in an orphanage.

The rarity of the disease in this part was against this diagnosis, but no other disease would give a similar clinical picture. The diagnosis was subsequently clinched by the 'therapeutic' test.

Treatment.—She was given symptomatic treatment for her diarrhoea, sodium bicarbonate colonic wash and a soda bismuth chalk mixture. Iron and arsenic were also given to improve the anæmia. But the most important item in her treatment was the supply of vitamin B; she was given marmite one teaspoonful thrice daily and improved steadily. A month after admission to the ward the diarrhoea had stopped, appetite was much better, and pyrexia had disappeared. Pigmentation over nose and face disappeared, only slight traces left on the dorsum of hands; pigmentation over dorsum of feet not much improved as yet. Œdema of feet is just the same; anæmia is also not much improved, the blood count being :—

Total red cells = 1,750,000.

Hæmoglobin = 40 per cent.

After the 20th May she was put on liver in addition. This was given in the form of Campolon (Bayer) 2 ccm. intramuscularly every third day. This improved both the general condition and the anæmia very quickly and steadily. On the 20th July, 1934, when she was discharged as cured, she had no trace of pigmentation left, and the blood report was as follows :—

Total red cells = 4,500,000.

Hæmoglobin = 90 per cent.

It will be evident from the above that, though all other symptoms improved with marmite, liver treatment was essential for the anæmia.

My thanks are due to Khan Sahib Dr. Yar Mohammed Khan, M.P., for his kind permission to report the case and the valuable corrections and suggestions he has made; to Miss Binapani Dei, student in charge of the case, for the help I obtained from her history and progress report; and to my colleagues Dr. Hamid Hassan and Dr. C. L. Kapur for their valuable help.

A CASE OF CALCULUS FORMATION IN THE PREPUTIAL SAC

By V. N. TRIPATHI, L.M.P. (Agra)

Medical Officer, Civil Dispensary, Sheopur, Gwalior State

GANPAT, a Hindu male aged 45 years, was admitted to the Civil Dispensary, Sheopur, on the 18th February, 1934, for retention of urine. On cursory examination he was found with congenital phimosis with a pin-point central opening through the prepuce. On manipulation the glans penis appeared rather hard which led me to think that the prepuce must be firmly adherent to it. No probe or director could be inserted through the aperture, so the foreskin was divided in the middle with a pair of scissors. After division of the foreskin, I noticed three rather large, smooth and disc-like calculi about the size and shape of a nux vomica seed, evenly formed and centrally arranged one against the surface of the other anterior to the meatus.

The glans penis was rather small and subnormally developed—the prepuce being partially adherent to it—and the meatus was about the size of a big needle's eye. The size of the calculi was much larger than could pass through a normal human urethra, so it seems that they must have formed in the preputial sac from constant locking in of urine there with consequent decomposition and precipitation of phosphates and other salts.

It is remarkable that the patient could go on with constant partial retention of urine accompanied with irritation for such a long time as 45 years without it giving rise to any other grave symptoms.

AN UNUSUALLY LARGE HORN GROWTH

By J. M. RICHARDSON, M.D.

Civil Surgeon, Bilaspur, Central Provinces

I SEND herewith a photograph of a man who came for treatment to the Main Hospital, Bilaspur, recently, from the interior of the district with a large horn growing from the top of his head.

He was a young man of about eighteen years of age. His story was that he had a soft tumour about ten years back which, in the next six years or so, increased in size and then suddenly ulcerated. From this broken skin a horny growth protruded and attained to its present size in about six to eight years, its maximum rate of growth being in the last year. It gave him no trouble and he sought surgical interference only because he could not get any of his village maidens to marry him.



The horn is hard, devoid of any sheath and is of the following measurements :

Five inches in length from base to tip along its convexity.

Two and a half inches in length from base to tip along its concavity.

Four and a half inches in circumference at the base.

Three and a half inches in circumference at its middle.

It sprang from the aponeurosis of the occipito-frontalis and was easily removed. The spotted appearance in the photograph is due to the use of an old film.

[Note.—This report is of considerable interest, in the first place on account of the youth of the patient, because such growths are practically always found in old people only. A second unusual character is the large size of the horn. When in such a situation as the present one surgical removal is easy and the best form of treatment, because a large piece of tissue surrounding the base of the growth can be cut away. This is a necessary precaution on account of the

tendency for malignant degeneration to occur later at the site of the horn if it is not thoroughly removed.—
EDITOR, I M G]

A CASE OF TRIPLET PREGNANCY

By K. B. SEN ROY, BSC, MB, BS., P.M.S.

Medical Officer in-charge, Sadar Hospital, Ghazipur

A FEMALE named Swarathia, Ahir by caste, aged 35 years, multipara, of village Garthauli, came to the Dufferin Hospital, Ghazipur, at 2 a.m. on the 30th August, 1934, with one female child born but still attached to the mother by the cord.

This child was delivered at her house in her village at about 7 a.m. on the 29th August, 1934, with very slight labour pains.

In spite of the delivery of a child, the enlargement of the abdomen did not appear to have diminished. The pains were very slight.



On admission the usual routine procedure for normal labour was gone through when the second child, a male, was born at about 4-30 a.m. and the third, also a male, was born at 5 a.m. on the 30th August, 1934. The delivery of both the children was quite normal, the presentation being occipito-anterior. The placenta, which was single, was delivered fifteen minutes after the third child.

All the children were quite healthy. The first female child weighed six pounds and the second and third males weighed six and a half pounds each.

In the accompanying photograph, the female child is lying on the ground whereas the two male children are in the mother's lap.

The mother left the hospital quite well on the fourth day after her delivery.

This case is of interest because it is unusual for triplets to be served by a single placenta, and the size of the children was also exceptionally large.

I am thankful to Dr. Gourinath, L.M.S., Civil Surgeon, Ghazipur, for his kind permission to publish the case and to Dr. (Miss) Lee, Medical Officer-in-charge, Dufferin Hospital, Ghazipur, for furnishing me with notes about the case.

Indian Medical Gazette

MARCH

DRUG ADDICTION IN INDIA

Drug addiction is one of those unfortunate subjects which is nobody's special concern. Those who give the matter any thought usually consider that 'something ought to be done about it', but by somebody else, and they seldom have any very clear idea what this something is and by whom it should be done; the vast majority, however, prefer not to think about it at all and to hope that by this simple expedient they may ensure its non-existence in their own particular world. This way of escape from responsibility is not, however, open to the conscientious medical practitioner.

To the average medical man drug addiction suggests opium, the League of Nations, legislation, the finance department and the excise authorities; his next mental reaction is that it is a dangerous subject with too many social, political and even international implications, and that therefore it had better be left severely alone. Nevertheless, drug addiction is primarily a medical subject. If the smoking of opium were no more harmful than the smoking of tobacco, or if the opium *goli* were as innocuous as chewing-gum or even *pan*, this drug would never have come within the purview of the League of Nations and governments of individual countries could have looked upon it simply as a legitimate and very valuable source of revenue. Unfortunately, the opium habit is a harmful one, both to the body and to the mind, and, therefore, together with other drug habits, it becomes a medical subject of very considerable moment; and on this fact alone does its importance in other spheres depend.

The reasons that can be assigned for the neglect of the drug-addiction problem in general appear to operate with greater force in this country than in most others. The vastness and many-sidedness of the problem are to a great extent responsible for this, but there are additional excuses for this neglect, the first of which is a very familiar one, namely, that there are so many more acute, more dramatic, and, from the point of view of the medical investigator, more promising diseases—and disease it must be considered—than drug addiction; another is that in India there are so few residential institutions of any kind, infirmaries, sanatoria or mental hospitals, where more chronic conditions can be treated and none, as far as we know, devoted to drug addicts. We do not suggest that the time has yet come when the absence of these institutions is a slur on the state of advance of civilization in this country, but nevertheless the investigator

is discouraged by the fact that the forms of treatment most in use in western countries cannot be applied here on account of the absence of the institutions which are an essential part of these treatments.

In view of all these considerations, it is very much to the credit of Colonel Chopra and his co-workers at the Calcutta School of Tropical Medicine that they have taken up this 'unpromising' subject during the last seven or eight years. Their investigations were facilitated by a grant from the Indian Research Fund Association, which has enabled them to carry out these investigations in every part of the country.

The results of this work have been published in a series of articles which have appeared from time to time either in this journal or in the *Indian Journal of Medical Research*, and the paper in this issue summarizes some of the observations of these workers up to the present.

This enquiry has thrown considerable light on a subject about which little was hitherto known and has brought to our notice a number of important facts which will be invaluable to those interested in the medical aspects of drug addiction, but, as Colonel Chopra has repeatedly pointed out, he has so far only touched the fringe of a subject on which there is still much important work to be done; the reports that have been issued have already attracted the attention of those concerned with drugs of addiction in their social, commercial, financial and international aspects.

One point is brought out very clearly, namely, that drug addiction is not static; everywhere there are signs of the older drugs losing their grip on communities as a whole, and their popularity amongst the younger members in particular; in some communities that forty years ago were notorious for their addiction to opium, there are now far fewer addicts and the average consumption of opium per addict has fallen to more than half its previous figure.

That is the bright side of the picture, but there is another side; new addictions are establishing themselves and in most cases these addictions are more insidious and more detrimental to the addict. The drugs used are not only the alkaloids such as morphia and cocaine, which are subject to official control, though they are still smuggled into India from the Far East in large quantities, and in some towns in India are becoming a very serious problem, but other drugs such as chloral hydrate and the barbiturates over which there is no control and which can be purchased over the counter by anybody. There is no provision in the Poisons Act of 1920 (amended 1931) for these and other potential drugs of addiction, and there is here an excellent opportunity for intelligent legislation to step in and prevent these drugs becoming drugs of addiction before they have

established themselves. In the Poisons and Pharmacy Act, 1908 (amended 1926), of Great Britain such substances are placed in part II of the schedule, which means that they can only be sold on the prescription of a qualified medical man; such a provision does not impose any great hardship and if the Poisons Act were amended on these lines it would do much to control the sale of these drugs.

The consumption of hemp drugs has decreased considerably during the last few decades, but it is estimated that there are still over a million addicts, and there is considerable evidence pointing to the association of hemp-drug addiction, and insanity and crime. This in itself presents a problem which promises to repay more thorough investigation.

Just as is the case with most other medical problems, the drug-addiction problem in India presents many special features. In Europe and America drug addiction is usually much more acute; the addict uses the purified alkaloids in most instances and either kills himself within a few years, or goes into an institution and becomes cured. In India it is quite different, drug addiction often—one might say usually—takes on a much less acute form, and it is not uncommon for addicts to remain addicts for twenty, thirty, and even forty years; little is known about the pathological changes that occur in these chronic addicts, as there has been no scientific investigation of the effects of prolonged administration of these drugs.

Treatment of drug addiction is another important problem; it is fraught with many

difficulties, not the least amongst these being that the patient himself usually has little real wish to be cured, and therefore it is essential that the physician should be able to exercise some personal psychical control over the patient; this is all the more essential where institutional treatment is not possible, but there are certain drugs which can be given that will help the addict during the period of withdrawal and which in themselves present less difficulty when the time comes for their withdrawal. An interesting method, which has been introduced comparatively recently, consists in the subcutaneous injection of vesicatory fluid obtained from the addict himself; very remarkable results have been claimed from this and it has the great advantage of extreme simplicity.

From the economic point of view the loss to the country through drug addiction can well be imagined, when it is calculated that there are 3 to 4 million adult addicts in British India alone and in many of the Indian states things are said to be much worse; without considering the possibility of these people being a charge on the community by becoming insane or criminal, they present a considerable loss as they nearly all cease to be of any economic value to the community from the time that they become addicts.

But as we have already said this problem of drug addiction is primarily a medical one and we hope that Colonel Chopra's work will stimulate an interest in a subject which up to the present the medical profession in this country has tended to neglect.

Commentaries

DISTRIBUTION OF SIMPLE GOITRE IN DERBYSHIRE

BEFORE the Royal Society of Medicine in the section of Epidemiology and State Medicine, on 28th April, 1933, Dr. P. H. J. Turton presented the results of his many years' work on the distribution of simple goitre in Derbyshire, which is of profound interest to those in contact with endemic goitre, and especially to those who have hesitated to discard the old view that endemic goitre in certain areas is mainly due to an excess of calcium and to accept, without reserve, the modern view that such goitre is really due to iodine deficiency.

So great an influence have the results of laboratory animal experiments, chemical analyses, and deficiency theories obtained with the medical profession that the value of the great experiments of nature in the super-endemic areas of goitre are in danger of being overlooked. Such laboratory work is of great value and has provided a new angle of vision to the problem of goitre. Moreover field

investigations in some instances appear to support an iodine deficiency theory. But just as laboratory results in a clinical case must be tempered by the wise discretion of the investigating physician, so laboratory results in relation to endemic goitre must be valued by field workers in super-endemic regions such as in the Himalayas, where the goitre rate frequently rises to 50 per cent, and maybe to 80 per cent of the population of the area affected. The pendulum has swung too far in the direction of iodine deficiency as the sole or even primary factor responsible for endemic goitre. To sponsor any other cause of goitre has become almost a heresy in modern medicine, to such an extent that even a standard textbook of medicine, such as Price's, has now no reference to calcium as even a factor in goitre production.

The remarkable connection between goitre and calcium in water in those super-endemic areas, the Himalayan and sub-Himalayan regions of the United Provinces, has already been described (Stott, *Indian Journal of*

Medical Research, April 1931). The conclusion has been reached that the most probable cause of endemic colloid goitre of the United Provinces is an excessive intake of calcium through the drinking water. There was no evidence that iodine deficiency nor intestinal infection from polluted water supplies were the primary cause of goitre in the United Provinces.

The diets of almost all villagers in the endemic area were undoubtedly markedly deficient and the waters of all wells were undoubtedly markedly polluted, but no such clear relationship existed between such deficient diets and such polluted wells and the endemic and non-endemic villages (which often adjoined), as was shown to exist between calcium water supplies and goitre villages (Stott, *Indian Journal of Medical Research*, July 1932).

Dr. Turton's able, full and painstaking investigation on the distribution of goitre in Derbyshire adds fresh interest to the subject. Dr. Turton spent a large part of eight years (1923 to 1930) in his survey. He examined 40,044 children between 8 and 13 attending the Derbyshire elementary schools and found that the goitre rates varied according to age between 1 and 10 per cent for girls and 0.5 and 4 per cent for boys. The average for school children varied between 2 per cent and 8 per cent, according to locality, for small goitre, and between 1 per cent and 2 per cent for goitres sufficiently large to cause a bulging or superficial inspection. No cretins, congenital deaf-mutes, or adults with myxoedema were recorded. The degree of endemicity therefore was hardly comparable with the super-endemic Himalayan areas.

Geology.—The whole of Derbyshire is based on mountain limestone, and areas with a water supply from carboniferous limestone have always been goitrous, but a number of places have been supplied with water from millstone grit of sandstone with the result that the disease has either disappeared or greatly diminished. The incidence of goitre in the millstone grit (sandstone) areas, as compared with the limestone areas, is about 4 to 1 in favour of the limestone.

Influence of iodine content of soils and water.

—From an analysis of the iodine content of many soil and water samples, Dr. Turton shows that the results obtained indicate that there is no definite correlation between the iodine content of drinking water and the goitre incidence in Derbyshire, and again that so far as he has been able to go there is no evidence that iodine insufficiency is or has been a principal factor in the genesis of goitre in Derbyshire.

Orr and Taylor independently have concluded that at present no correlation between the level of iodine in drinking water in England and the

incidence of endemic goitre has been made out.

In Heanor, each child was given 1/10 grain iodine in sweets, weekly, and the public water supply was iodized by the addition of sodium iodide in such an amount that, if a person consumed four pints of water a day, he would receive in one year 14.9 mgm. of sodium iodide. No decrease in the incidence of thyroid enlargement was observed in ten to eleven months in any series receiving either iodized water alone, or iodized water *plus* sweets. From this experiment Dr. Turton concluded, whatever the cause of goitre in these children, iodine deficiency was not the sole cause.

Dr. Turton does not regard these goitres entirely as colloid goitre, but remarks that even with goitre there is no deficiency of iodine in the gland, in which it seems to be 'locked up'. Excess of calcium is, he says, certainly involved in the production of colloid goitre, which is the only type of simple goitre amendable to iodine therapy.

The influence of water supply.—'There is a good deal of evidence in Derbyshire that drinking water is a powerful agency in the production of goitre. Goitre has either diminished or disappeared in many places following the introduction of better water supplies. Where two water supplies exist, it is common to find that one is goitre-free and the other is associated with goitre. Since the water of Heanor has been efficiently filtered and continuously chlorinated there has been a marked reduction in the goitre incidence. If there was any exciting cause for goitre at Heanor it was not iodine deficiency'.

In regard to calcareous water, whether the chalk was in suspension or in solution, causing goitre, Sir James Berny during his goitre observation in Derbyshire observed that in many goitrous localities calcareous matter in very fine division was in the water supplies. When goitre was common in Heanor there was certainly a great deal of suspended calcareous matter in the treated water. The reduction in the goitre incidence followed the removal not only of calcareous suspended matter but also of noxious animal matter. There is no doubt that calcium excess does play some part in the production of colloid goitre, but it appears that unbalance of calcium and phosphorus, or unbalance between calcium phosphorus and iodine, is responsible. Dr. Turton produced a colloid goitre in a male dog, sixteen days after giving it sterilized calcareous deposit from the sedimentation tanks of the Heanor water works.

Influence of ill-balanced diets.—The chief fault in the diets of goitrous Derbyshire children are often a total absence of fresh vegetables and fruits, the substitution of butter by margarine, too much reliance on white bread, and insufficient meat and milk. An improperly balanced diet is a much more important factor

in the genesis of thyroid disease than was formerly supposed. Not only is thyroid disease related to vitamin unbalance or deficiency but also to mineral unbalance between calcium phosphorus and iodine. To consider diet from the view-point of iodine deficiency alone is much too narrow and leads only to the greatest confusion.

Conclusion

Dr. Turton concludes that the cause of goitre in Derbyshire is not any single agent. Impure and unprotected water supplies, and intestinal infection, possibly specific, play a large part and have played a large part in the production of goitre. But there are so many variations within the same region of supply that certainly there are other factors in operation apart from

puberty or sex. Food supply in relation to mineral unbalance, iodine deficiency or vitamin content all no doubt play their part. Simple goitre is a misnomer: the problem of causation is by no means simple.

Dr. Turton states that he has indicated the distribution of childhood goitre in Derbyshire, and leaves it to others to solve the problem of the very definite relationship between goitre in the limestone region of Derbyshire and the almost total absence of the disease in the sandstone region in the south.

H. STOTT, M.D. (Lond.), F.R.C.P. (Lond.),
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LIEUT.-COLONEL, I.M.S.

KING GEORGE'S MEDICAL COLLEGE,
LUCKNOW.

Special Article

THE DEVELOPMENT OF OPHTHALMOLOGY IN BENGAL*

By E. O'G. KIRWAN, F.R.C.S.I.
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DURING the régime of the East India Company the first properly organized hospital, the Calcutta General Hospital, was established in 1790 in Calcutta. This was followed in 1792 by the opening of the Calcutta Native Hospital. The former is now represented by the present Presidency General Hospital, the latter was rebuilt and renamed as the present Mayo Hospital which was opened in 1874.

The Calcutta Native Hospital appears to have been the first institution to provide scientific treatment for diseases of the eye, and, even now, in spite of more up-to-date hospitals in Calcutta, the Mayo Hospital still carries the tradition among the inhabitants of Bengal as a place from which blind persons return with their sight restored.

Centuries before the introduction of the European system of medicine into India, the treatment of eye diseases was in the hands of quacks and couchers, better known as *mals*, *rawals*, or *hakims*. Cataract and eye diseases being very prevalent in India, these quacks abounded everywhere. Some of them attained a considerable amount of skill and established reputations for the cure of cataract.

Old records are available which relate that officials, business men and planters suffering from eye diseases were apt to consult established *mals* and, even when European medical

treatment was available, a *mal* named Sham Charan flourished in Bengal in the early days of the East India Company, and his name can be traced in the official records.

It was easy for the successful *mal* to score over the European surgeon in those days, and no wonder, as the former would travel from one end of the country to the other with his instruments and paraphernalia, leaving in his trail a certain amount of success and happiness, though more often failures and sufferings produced by his handiwork, which were attributed to the work of evil spirits or bad luck.

In the year 1798, Dr. Shoolbred, the superintendent of the Calcutta Native Hospital, published in the annual transactions of the hospital the treatment of two cases of cataract, 20 cases of phlegmon of the eye, and 30 cases of ophthalmia. The number of eye cases reported in the hospital transactions treated in this institution steadily increased from year to year.

In the year 1816, Dr. Luxmore, an assistant surgeon in Calcutta, petitioned the Governor-General in Council for an endowment to extend and improve his private eye hospital which was situated in Chowringhee, and which was apparently opened two or three years previously. In his application he states, 'The various opportunities I have had in the treatment of cataract have afforded me the pleasing gratification of rendering the operation so successful as generally to restore sight to those who were blind from any species of cataract, from the infant born in that state to the adult at an advanced period of life provided there was no other defect in the organ of sight'. His petition was forwarded to the Medical Board and Doctor R. Leny, secretary of the Medical Board, replied that 'Many eye cases are at

*A paper written for the centenary of the Calcutta Medical College in January 1935.

present cured in the Calcutta Native Hospital in which the operation for the cure of cataract is performed with great skill and success and where professional assistance for these kinds of cases is never refused. The Government by granting an additional pecuniary aid to the Native Hospital would enable the governors of that institution to construct an exclusive ward for diseases of the eye'. Since that date the Calcutta Native Hospital kept a separate register of eye diseases although no separate ophthalmic department was opened.

In the year 1828, the Hon'ble Directors of the East India Company in London sent Doctor C. C. Egerton to Calcutta to establish an eye hospital there. He is mentioned as having been trained in ophthalmology in London under Dr. Travers who was the leading eye doctor in England at that time.

The Eye Hospital situated at the junction of Wood Street and Theatre Road, Calcutta, on the present site of the Saturday Club and mentioned in old records, was probably started by him.

From the years 1800 to 1850 mention is made in official records of the following surgeons who carried out treatment of diseases of the eye:—

Dr. J. Shoolbred	..	1794-1821
" P. Breton	..	1801-1830
" J. Jameson	..	1807-1820
" T. Luxmore	..	1813-1825
" Simon Nicholson	..	1816-1855
" J. R. Martin	..	1817-1839
" C. C. Egerton	..	1824-1847
" E. W. W. Raleigh	..	1839-1845
" R. O'Shaughnessy	..	1841-1845
" J. Jackson	..	1845-1855

Dr. Peter Breton was superintendent of the first Native Medical School in Calcutta. He was a very versatile author, and among his writings was an article on the native method of couching, published in 1826. He died in Calcutta in 1830.

Dr. James Jameson was the first superintendent of the Calcutta Native Medical School in 1822. He died in Calcutta in 1823.

Dr. Thomas Luxmore died in Lucknow in 1828.

Dr. Simon Nicholson was one of the original fellows of the Royal College of Surgeons of England and died in Calcutta in 1855, having given 48 years' service. His picture in oils is in the rooms of the Asiatic Society, Calcutta.

Dr. James Ronald Martin was the surgeon superintendent of the Calcutta Native Hospital from 1830 to 1839. He was one of the original fellows of the Royal College of Surgeons in 1844 and was the first president of the Medical Board of the India Office in 1864. He was made a fellow of the Royal Society in 1885 and was knighted in 1860, and was a writer of repute.

Dr. C. C. Egerton was also one of the original

fellows of the Royal College of Surgeons of England.

Dr. E. W. W. Raleigh was an original fellow of the Royal College of Surgeons.

Dr. John Jackson was an original fellow of the Royal College of Surgeons of England in 1844 and became a fellow of the Royal College of Physicians of London in 1859. He was an author of repute.

Doctors Breton, Jameson and Nicholson are also mentioned in connection with the teaching of medical students in diseases of the eye.

In the year 1835, the Calcutta Medical College with its associated hospitals was established and in the records of those institutions, the earliest eye work mentioned was in the year 1840, and the name of Doctor Martin is associated with it. He was the first part-time professor of ophthalmology. An actual separate eye department in connection with the Medical College Hospitals was established in the year 1860 in Halliday Street at the site now called Mohomed Ali Park, south of the present Fire Brigade and Ambulance Station on Chittaranjan Avenue. Dr. Archer was the first surgeon in charge and in addition was also part-time professor of ophthalmology in the Calcutta Medical College. He introduced more modern ophthalmic methods in diagnosis and treatment. He adopted the extraction operation for the cure of cataract, the iridectomy operation for glaucoma, condemned the operation of couching as practised by *mals* and *kabirajis*, and introduced the ophthalmoscopic examination of the eye with Libreich's ophthalmoscope. Many other improvements, including the regular use of chloroform anaesthesia in intra-ocular operations, are attributed to him.

In 1867, Dr. Archer was succeeded by Major N. C. MacNamara, I.M.S., who later made for himself a great reputation as an able ophthalmic surgeon and teacher as well as a great administrator. It was due largely to his initiative and energy that the present Mayo Hospital was built and opened in 1874. He was the first professor of ophthalmology in the Calcutta Medical College. He was a pupil of Sir William Bowman, F.R.S., and studied under many of the leading ophthalmic surgeons in Europe at that time, and verily can be classed as the father of modern ophthalmic teaching in Bengal. It is now of interest to know that he disagreed with the theory then prevalent that the lens was composed of tubular fibres and cataract was due to molecular changes taking place in the lens. He taught his students that cataract in very many cases was due to fatty degeneration of the lens fibres and this condition may be induced by causes affecting its nutrition whether arising from alteration in the blood, from defective innervation, mechanical separation or, lastly, inherent defects in the germinal matters from which the fibres of the lens are formed. He advocated

and practised the removal of the cataractous lens by linear extraction with a horn scoop without iridectomy for all forms of cataract affecting the inhabitants of India, whether European or Indian. He forcefully condemned the operation of reclinatio which was at that time discarded by the majority of surgeons in Europe, but nevertheless still had its advocates, as well as being the method of adoption by the *kabirajis* and *muls* in India. He advocated removal of the lens in its capsule in cases of immature cataract that had caused considerable impairment of vision so that none of the soft and transparent cortical matter might attach itself to the iris.

In 1867, the year that MacNamara became the first whole-time professor of ophthalmology, the senate of the Calcutta University insisted on students coming up for examination not only producing certificates of having attended an ophthalmic hospital and lectures on the subject, but that each should pass a clinical as well as a written examination so that the test entailed a practical acquaintance with the principles of ophthalmology.

In MacNamara's time cocaine had not come into use in ophthalmic surgery, the operations being done without an anæsthetic or under chloroform. He was a great advocate of doing all eye operations under chloroform and disagreed with Von Graefe who did not approve of chloroform. Ether anæsthesia was then thought to be impracticable in warm climates. He described the technique to prevent vomiting after operation which was the great argument put forward against chloroform.

Dacryocystitis and mucocele, which are very common diseases in Bengal, were at that time treated palliatively by the use of probes and more radically by destruction of the lacrimal sac by chemicals which were followed later in some cases by the removal of the lacrimal gland.

In 1874, MacNamara retired to practise in London, where he quickly became a prominent ophthalmologist, was appointed to the staff of the Westminster Ophthalmic Hospital and later became vice-president of the Royal College of Surgeons of England.

In 1867, he published an excellent textbook on ophthalmology, based on the lectures he delivered to the students of the Medical College. His work was subsequently translated into Hindi by his able assistant Dr. Lal Madhab Chatterjee.

Major Caley, I.M.S., succeeded MacNamara and it was in his time as professor of ophthalmology that the Halliday Street Eye Hospital with its 20 beds was abolished, and its equipment, apparatus, etc., transferred to a portion of the Medical College Hospitals in the building in which the present emergency and observation wards are located.

Major Caley was succeeded in 1886 by Major R. C. Sanders, I.M.S., and from this year to the early years of the present century, Sanders dominated the ophthalmic world in Bengal and was the most prominent ophthalmic surgeon since MacNamara. He was a very skilful surgeon and built up an extensive private practice. He is still remembered widely by many of the older residents of Bengal, some of whom owe their eyesight to his handiwork. He was not, however, a good teacher. In his time, in the year 1891, the Shama Charan Law Eye Infirmary was opened with 57 beds at the junction of Colootollah and College Streets; this was due to the munificence of Babu Shama Charan Law. The Medical College Eye Department was shifted to this hospital from this year.

In 1901, Sanders retired from the professorship of ophthalmology, but continued to reside and practise in Calcutta. The Marwari population in Calcutta built the present Marwari Hospital on Harrison Road in the year 1902, and he was the first surgeon in charge and popularized that institution as a centre for the treatment of eye diseases.

In 1901, Lieut.-Col. J. Lewtas, I.M.S., succeeded Sanders as professor of ophthalmology and remained for four years. Lewtas is still remembered as a very pious man who prayed in the Board Room of the Mayo Hospital before starting the work of the day.

In 1905, he was succeeded by Major Maynard, I.M.S., who was later to follow in the footsteps of MacNamara and Sanders in making a great reputation both in and out of India and, with other distinguished ophthalmologists of his time in India, Lieut.-Cols. Elliot, Herbert and Smith, add renown to Indian ophthalmology.

In 1910, Maynard pointed out the necessity of a new, enlarged and modern eye hospital and school which would be worthy of such a large city as Calcutta. He drew up the plans of the present Eye Infirmary and, due to his enterprise, energy and skill, his proposals were finally approved by Government in 1916. Owing to the Great War and lack of sufficient funds, Maynard was destined not to see the fruits of his labour completed as he retired in 1919 and the new Eye Infirmary was not finished till 1923. It was finally opened for the reception of patients in September 1926 during the period that Major Kirwan, I.M.S., was officiating professor of ophthalmology.

Maynard was a writer of repute, his best work perhaps being his two manuals of ophthalmology published in 1929 and based on the systematic course of lectures he delivered to the students of the Medical College, Calcutta.

In 1919, Major W. V. Coppinger, I.M.S., succeeded Maynard, and during his time ophthalmology entered upon a new phase with the

advent of the Gullstrand slit lamp and corneal microscope. The present Eye Infirmary was equipped with every modern apparatus. The special pathological department of the Eye Infirmary alone lagged behind; this part of ophthalmology continued to be carried out by the department of pathology in the Medical College.

In 1928, two honorary ophthalmic surgeons were appointed to the visiting staff of the Eye Infirmary, Dr. S. K. Mukherjee, F.R.C.S.D., and Dr. T. Ahmed, F.R.C.S.E., and both still remain on the staff.

In 1929, the present professor, Lieut.-Col. E. O'G. Kirwan, I.M.S., succeeded Coppinger, and is still in charge.

During the last five years, ophthalmology has undergone considerable progress and change.

The intracapsular operation for cataract, carried out in Northern India by Lieut.-Col. Smith, I.M.S., and his students and performed according to his technique, was never popular with ophthalmologists working in Calcutta about that time, being condemned as unsafe as a routine method for the extraction of cataract.

The intracapsular operation recognized by most ophthalmologists as the ideal one is now carried out extensively by safer methods such as the Barraquer suction apparatus and by the intracapsular extraction forceps, so much so that fully 50 per cent of all cataracts taken out in the Eye Infirmary in the Medical College in the last year were done by the intracapsular method.

Much progress has been made in the diagnosis and treatment of glaucoma, so common in Bengal.

With the advent of diathermy, the treatment of retinal detachment, formerly a hopeless condition to treat, has taken on a new phase and fully 50 per cent of all cases can now be cured.

Plastic surgery with conjunctival and skin grafts has been developed to a very high degree of efficiency.

Finally, corneal transplantation in cases of opaque corneas has been carried out in the present year with excellent and promising results.

The present Eye Infirmary of the Medical College Hospitals consists of 139 beds in the intern department and a huge out-patient department which is capable of handling up to 400 patients a day for the treatment of eye diseases and refraction errors. Here also is located the office of the Association for the Prevention of Blindness, Bengal.

The work of the Eye Infirmary shows an ever-increasing popularity and an analysis of

the work done in the last six years is shown below :—

Indoor patients				
Year		New	Old	Total
1928	..	2,364	33,875	36,239
1929	..	2,399	37,260	39,659
1930	..	2,503	36,646	39,149
1931	..	2,443	39,553	41,996
1932	..	2,613	39,901	42,514
1933	..	2,778	48,820	51,598
Outdoor patients				
Year		New	Old	Total
1928	..	20,333	40,246	60,579
1929	..	23,696	50,582	74,278
1930	..	26,067	55,724	81,791
1931	..	27,504	58,195	85,699
1932	..	31,890	57,890	89,780
1933	..	33,769	60,784	94,553

The magnificent work carried out by Indian ophthalmologists in the advance and progress of ophthalmology in Bengal must not be overlooked. In the early days in Bengal, they were trained by the European doctors practising eye diseases and had much to contend against in the way of *kabirajis*, *mals* and quacks of all kinds. From the year 1860 onwards the name of Dr. Nil Madhab Halder appears in official records as an eye doctor of repute and his name is still remembered. Later, Dr. Lal Madhab Mukherjee, who was assistant to Lieut.-Col. MacNamara, established a great reputation as a surgeon, teacher and writer. From 1870 onwards, Dr. Khirode Nath Dutt was also a prominent eye doctor practising in Calcutta. He was attached for 45 years to the Mayo Hospital, retired in the year 1927 and died only recently, in 1934, in his 80th year. His brain remained very clear up till the end, and he was present at the Third Conference of the All-India Ophthalmological Congress held in Calcutta in 1933. It was of great interest to hear from him that in the last decade of the 19th century and the first decade of the 20th century that ophthalmic practice consisted more in prescribing remedies than in doing intra-ocular work.

Other prominent Bengali doctors who flourished about the end of the last century were doctors Mon Mohan Bose, Atul Bose and K. K. Bagchi.

In the history of ophthalmology of Bengal, the name of Dr. M. K. Chatterjee must not be overlooked. He was formerly on the staff of the Mayo Hospital for seven years, was the founder of the Eye Department in the Carmichael Medical College, Belgachia, and still remains in charge.

My thanks are due to Captain S. Dutt for his help in searching through the records to obtain information in writing this history.

All over India cataract is a common disease of the eye in elderly people and operations for the cure of cataract are very common. As it

is a speciality that has made ophthalmologists working in India the most expert cataract operators in the world, it is of interest to give a short account of the development of the technique of cataract operations.

In the year 1748 Davel in France and his colleagues in Europe had been advocating the extraction operation for cataract. In Bengal, and in India in general, it can be found from old records that three methods of the cataract operation were in vogue amongst ophthalmologists of those days (1790 to 1858), depression (or reclinatioⁿ or couching), extraction and needling.

Of these, for many years the operation of depression was looked upon as the easiest operation and the one of choice in the hands of surgeons of average skill in the general class of patients met with in practice in India.

The operation of extraction, which undoubtedly led to excellent permanent results if successful, had so many pitfalls and complications in those days that only skilful and experienced

eye surgeons practised it and then only on selected patients. There was no preliminary cleansing of the conjunctival sac and the operation was done either without an anæsthetic or under chloroform. It can therefore be surmised how frequent bad results were. The extraction was carried out with a Beer's knife which was pushed from one end of the cornea to the other and the section then completed. The lens was either removed by pressure or by means of a specially modelled horn spoon or vectis. This was no mean effort of skill and apparently a fair proportion of the patients operated upon had more or less useful sight; that amount of success was considered satisfactory by those concerned. Nowadays modern work demands, and very rightly so, perfect results, namely vision 6/6 with glasses and to be accomplished with little astigmatism and good cosmetic results. This goal has now very nearly been achieved, and, by modern methods, 90 per cent at least of patients operated upon for cataract recover normal vision.

Medical News

HUNTERIAN SOCIETY GOLD MEDAL FOR PRACTITIONERS

The rules governing the award of this medal have recently been altered.

Any registered general practitioner resident within the British Empire is eligible to compete, and the medal, which is of gold, is awarded annually to the writer of the best essay on a subject selected by the Society.

Competitors—men or women—must be engaged in general practice and essays should be sent in by 31st December.

The essay must be unpublished and original, and be based on the candidate's own observation, but it may contain excerpts from the literature on the subject, provided that reference be made to the articles from which they are taken.

A copy of the rules and any further information can be obtained on application to the Honorary Secretary, Mr. Martin Oldershaw, 26, Upper Wimpole Street, London, W.1.

The subject selected for the essay is, for 1935, 'The Conduct of Midwifery in General Practice' and for 1936 'Rheumatoid Arthritis: Its Diagnosis, Treatment, and End-results'.

LIVERPOOL SCHOOL OF TROPICAL MEDICINE

Presentation of Mary Kingsley Medals

ON 6th November, 1934, Mary Kingsley Medals were presented to two honorary recipients and to four scientists who have rendered distinguished service in the field of tropical medicine. Lord Leverhulme entertained the recipients and a number of former medallists at dinner at the University Club, and afterwards held a reception at the School of Tropical Medicine, which was attended by a large and representative gathering.

The medal was struck in commemoration of the work of the late Miss Mary Kingsley in West Africa many years ago and it is presented from time to time in recognition of brilliant scientific work, for the most part in tropical medicine.

In the present instance two of the presentations were honorary, that to Mrs. Middlemass Hunt being in recognition of the work of her husband as honorary Dean to the school for many years, which on his death was followed by an endowment for the purpose of establishing the post of Director of the Sir A. L. Jones laboratory, Sierra Leone, on a secure footing.

Miss A. R. Caton was given the medal partly in recognition of the work of her father, Dr. Richard Caton, on behalf of the school, and partly on account of her own interest in matters of tropical hygiene, she being secretary of the Indian Village Welfare Association.

The four recipients of the medal for valuable work in scientific medicine were Dr. Henry Beeuwkes, Sir George Buchanan, Sir S. Rickard Christophers and Sir Malcolm Watson.

Dr. Beeuwkes has been the director of the Rockefeller Yellow Fever Commission in West Africa which has been responsible for our great advance in knowledge of this disease in the past ten years.

Sir George Buchanan has been very largely responsible for the formation of the Health Organization of the League of Nations which was the coping-stone of a valuable career in public health work in Great Britain.

The work of Sir Rickard Christophers and Sir Malcolm Watson is so well known to our readers that it needs no comment from us.

CONFERENCE FOR MEDICAL OFFICERS IN INDUSTRY OVERSEAS

It has been felt for some time that sufficient opportunity has not been given to medical officers in

industry overseas to exchange views on the various problems peculiar to their particular industries and to the areas where they are practising.

It is proposed to hold at the London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C. 1, an annual conference, lasting for two days, in order that medical officers in industry on leave from the tropics may be able to meet their colleagues and discuss their problems. The main subject for discussion will be the prevention of disease, e.g., control of malaria and epidemic diseases in the tropics; water supplies; sewage and refuse disposal; housing; the keeping of records; and hygiene generally.

It is considered that the contacts made at the annual conferences will not only be of value to medical officers attending, but will also establish contacts between these medical officers and the staff of the school.

All medical officers practising on plantations, mines, railways, hydro-electric and construction schemes and development companies generally will be welcomed. The conference each year will be held in July, and medical officers who would like to attend are invited to apply to the organizing secretary.

MEDICAL PRESS AND CIRCULAR

THIS journal re-issued in book form in June last the first series of articles it published under the title of *Modern Treatment in General Practice*; this book was reviewed in our November issue. We are now informed that this first edition is exhausted already, but that a second large printing has been made. The book is made up of 56 chapters, each of which is written by a specialist for the general practitioner putting before him authoritatively and concisely the latest methods of diagnosis and treatment. The fact that this book has had to be reprinted so soon is very clear evidence of its usefulness to the general practitioner. Doubtless also its low price of 11s. 6d. post free has also helped. We congratulate our contemporary on the well-deserved success of this book and again commend it most heartily to our readers.

INDIAN MEDICAL COUNCIL

LIEUTENANT-COLONEL C. E. PALMER, officiating Inspector-General of Civil Hospitals, Assam, has been duly nominated by the Government of Assam as a member of the Medical Council of India, *vice* Colonel J. P. Cameron, C.S.I., C.I.E., V.H.S., resigned.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE NINTH CONGRESS

THIS congress is normally a triennial event; it was held in Calcutta in 1927, in Bangkok in 1930 and it was to have been held in Nanking in 1933. However, on account of the disturbed state of China and of the fact that Nanking, the new capital of the country, was in a somewhat early stage of reconstruction at that time, it was considered advisable to postpone the congress until 1934; it was held from 3rd to 8th October.

The delegates to the congress were the guests of the National Government of China, by whose invitation the congress was being held at Nanking. The delegates about 400 in number, including at least 150 foreign delegates, were received and the congress was opened by His Excellency Wang Ching-wei, President of the Executive Yuan. The president and council of the congress were then elected, Dr. J. Heng Liu, Director of the National Health Administration and of the Central Field Health Station, being

unanimously elected as president and Professor E. W. Walch of Batavia as secretary.

The number of papers that had to be read necessitated the division of the scientific sessions into different sections. These were extremely well arranged and conducted; in no instances were the discussions guillotined or hurried, nor on the other hand were sessions unduly prolonged. Round-table discussions on cholera and plague were included in the programme and an unofficial one on kala-azar was also held.

Certain resolutions were formulated at the various sessions and discussions and eventually adopted by the whole congress; these were as follows:—

RESOLUTIONS PASSED BY THE F. E. A. T. M. CONGRESS, 1934

Cholera

1. This congress is of opinion that further investigation of "carriers" is desirable and recommends that such investigation be carried out in the countries of the Far East as and when opportunities arise.

2. This congress, having discussed the question of the protection conferred by the anti-cholera vaccine, is of the opinion that further statistically controlled field tests be carried out especially in those countries where such controlled tests have not yet been done.

3. This congress, having discussed the question of the relationship between the cholera vibrio and allied vibrios and their variants, is of the opinion that further study of this problem is desirable and that as far as possible the workers on this subject in different countries should exchange available information in order to correlate the results obtainable by the different methods employed.

4. This congress proposes that further field and statistical work be carried out in order to obtain more exact information than is at present available regarding the epidemic and endemic areas for cholera in the Far East.

Plague

1. At the Eighth Congress held in Bangkok in 1930, a resolution was passed strongly recommending rat-proofing of vessels as a practical means for preventing the spread of bubonic plague, and the value of this method has been amply demonstrated as a means of reducing and keeping the rat population of vessels to a minimum. Therefore be it resolved:

(a) To bring to the attention of all the constituent governments the urgent advisability of adopting practical measures for the rat-proofing of vessels; and

(b) That serious attention be given to the question of how far similar methods could be employed to keep railway systems free from rat infestation.

2. Be it resolved that in addition to rats and their fleas due attention be paid to other rodents and fleas, particularly *Pulex irritans*, capable of spreading infection.

Malaria

This congress, recognizing the pressing need for co-operative investigations in the problems of malaria control, wishes in particular to emphasize and direct attention to the fundamental importance in malarial epidemiology of studying biochemical changes occurring in the breeding places of anopheline mosquitoes.

This congress considers that advances of practical utility in the control of malaria might be made if the data obtained by workers in the countries of the Far East were made comparable.

It is resolved, therefore, that, with the consent of the governments concerned, such investigations conducted in various countries be co-ordinated through the appointment of a joint committee of chemists and malariologists resident in these countries.

It is recommended that this committee should be invited to formulate the general lines upon which biochemical investigations shall proceed, and that they should be asked to report to the director of the League of Nations' Far Eastern Bureau concerning the principles and methods of study which are likely to be most profitable and from time to time concerning the results achieved from their application.

General

1. That in view of the importance of the food-factor in diseases, a section on food problems be added to the programme of the next congress.

2. That a section on sanitary measures with reference to water supplies and sewage, and garbage disposal be added to the programme of the next congress.

The local committee had prepared a full and very enjoyable programme for the delegates, and on the afternoons not devoted to the scientific session and every evening excursions and entertainments, both scientific and otherwise, were arranged. Those who knew Nanking were somewhat apprehensive regarding the arrangements for accommodation, as there are few hotels, and for transport, as it is a city of great distances, the National Health Administration offices where the meetings were held being nearly ten miles from some of the hotels, but the fears turned out to be groundless, as every one was accommodated comfortably and a fleet of cars was placed at the disposal of the delegates, day and night.

Arrangements were made for those of the foreign delegates who could spare the time to visit other places of interest in China; some delegates went up the Yangtze river to Hanchow and the Gorges, others went to Peiping. In Peiping a local committee had arranged a programme which rivalled that in Nanking. A few hours spent in the wonderful Peiping Union Medical College alone provided sufficient justification for the time spent on the journey from India.

The delegates from India were Lieutenant-Colonel A. J. H. Russell (Public Health Commissioner with the Government of India); Lieutenant-Colonel R. E. Wright (Superintendent, Eye Hospital, Madras), Dr. Pundit (King Institute, Guindy), Dr. Alice Pennel (unofficial), and Dr. L. Everard Napier (Calcutta School of Tropical Medicine). Dr. B. Mukerji also of the Calcutta School of Tropical Medicine, temporarily working at the Henry Lester Institute, Shanghai, attended.

From Malaya the delegates were Dr. R. D. Fitz-Gerald (Director, Medical and Health Services, S. S. and F. M. S.), Dr. Nancy Lowther (Mrs. Fitz-Gerald), Dr. C. L. Park (Director, League of Nations' Eastern Bureau, Singapore), Dr. G. V. Allen (Principal, King Edward VII Medical College, Singapore), Professor J. L. Rosedale (Singapore), Dr. R. Lewthwaite (Institute of Medical Research, Kuala Lumpur), Dr. G. A. Ryrie (Sungei Buloh Leper Settlement, F. M. S.), Dr. J. W. Scharff (Senior Health Officer, Penang), Dr. A. L. Hoops (Malacca), and from Hong Kong Dr. A. R. Wellington (Director of Medical and Sanitary Services) and Dr. R. B. Jackson (Malariologist, Hong Kong).

Although it is only such a short time ago that the conference was held, we regret that we have already to report the death of two of the delegates; Dr. Nancy Lowther (Mrs. Fitz-Gerald) died very suddenly from acute cardiac dilatation in January, and Professor Walch (the general secretary) was killed in the Dutch Air Mail disaster in December; both had many friends in India.

The next congress will be held in 1937; both Saigon and Manila have been suggested as the venues, but, as no specific invitations have yet been received from the governments of either French Indo-China or the Philippines, the final decision has been left to a small committee.

THE ALL-INDIA OPHTHALMOLOGICAL CONFERENCE

The fourth All-India Ophthalmological Conference will be held in Madras during the Easter holidays from the 22nd to the 24th April under the presidency of Lieutenant-Colonel R. E. Wright, C.I.E., I.M.S.

The last conference was held in Calcutta in December 1933.

It is expected that ophthalmologists from all parts of India and from other countries will attend, and those visiting India for sight-seeing purposes will be very welcome should they care to attend.

One day has been set apart for a discussion on the nutritional diseases of the eye.

The importance of the All-India Ophthalmological Society need hardly be pointed out in a country in which eye disease is so common. The committee appeal to all members of the society to make every effort to be present at the forthcoming conference.

Current Topics

Recent Advances in the Treatment of Tropical Diseases

By SIR LEONARD ROGERS, K.C.S.I., C.I.E., M.D., F.R.S.
(From the *Practitioner*, Vol. CXXXIII, October 1934, p. 401)

IN no field has the modern science of chemotherapy produced as great therapeutic advances as in tropical medicine, and especially in the cure of wide-spread protozoal diseases; this is largely due to the possibility of testing the numerous compounds made synthetically by the chemists on animals infected with the parasites of malaria in small birds, trypanosomes in rats, etc. Some of those which were found to be effective in such animal infections have proved to have curative value in the corresponding important human diseases. The following is the present position

of some of the advances in this direction in the last decade or so.

MALARIA

The modern treatment of general paralysis of the insane by the artificial production of malaria has enabled carefully controlled experiments of prophylaxis and treatment of malaria to be carried out with important results. Thus the much disputed prophylactic value of quinine has been tested, and it has been shown that the administration of this drug for some days before mosquito infection with malaria does not prevent infection, but if it is continued daily for seven to ten days after the inoculation of the sporozoites into the human subject by infected mosquitoes, the development of clinical malaria is prevented by the curative action of the drug. Malarial fever produced by direct inoculation of infected human blood is more easily cured than that caused

by mosquito infection. Moreover, benign tertian infections tend to die out in some patients with production of immunity after some months of artificial infection with the disease.

Of still greater importance is the establishment of the value of two new synthetic drugs by experimental treatment of bird malaria, confirmed subsequently in the human subject. The first of these is plasmochin or plasmoquine, a quinoline compound which has the remarkable property of destroying the crescents and other mosquito-infecting gametocytes, which quinine itself does not do; it is being used in small doses, such as 0.02 to 0.03 gramme daily in adults and 0.01 in children, in labour forces to remove the infectivity of their blood to the anopheles and so to act as a prophylactic measure in reducing the prevalence of malaria among them. In larger doses the drug is also curative in benign tertian, though not in malignant tertian, but it is too toxic in such doses to be safe except in hospital cases.

The other effective new drug is atabrin, which is non-toxic and active in all forms of malaria in doses totalling 0.3 gramme daily in one or more doses, 8 to 12 full doses being sufficient; relapses appear to be less frequent than after quinine, although the early hopes that they would be eliminated have not been fulfilled. This drug is also preferable to quinine in the treatment of the blackwater fever complication of malaria, and it is tasteless.

TRYPANOSOMIASIS

Equally important are the advances in the treatment of the most deadly scourge of vast areas of tropical Africa, trypanosomiasis going on to the formerly invariably fatal later stage of sleeping sickness. The success in early cases of such arsenical preparations as atoxyl and soamin led to the production synthetically of innumerable arsenical compounds and their trial against human trypanosome infections of rats and other small animals, and thus resulted the discovery of Bayer 205 in 1900, still a secret German preparation, although Fournieu of Paris has revealed the complicated composition of his preparation 309, which appears to have the same physical and therapeutic properties. Shortly after this Louise Pearce and W. H. Brown, of the Rockefeller Foundation, New York, discovered a still more effective preparation in trypanamide, which has powerful curative action in all stages of the disease, including the late sleeping sickness one, whereas Bayer 205 is active only in the early stages of blood infection before the invasion of the cerebro-spinal system takes place. Both drugs cause rapid disappearance of very numerous trypanosomes from the blood of infected animals and of human subjects, although Bayer 205 appears to be the more effective in the first stage of the infection, and it is also of value as a prophylactic in those much exposed to infection. In early cases four to five weekly 1-gramme doses cure most cases. In the stages with cerebro-spinal involvement Bayer 205 fails to reach all the trypanosomes and trypanamide must then be given, preferably, according to C. C. Chesterman's extensive experience, in the large doses in adults of 3.5 to 4 grammes, or 0.06 gramme per kilo, in a dilution of 1-40 intravenously at weekly or fortnightly intervals, or diluted further with an equal quantity of water intramuscularly, careful watch being kept for any visual disturbances which indicate temporary cessation of the treatment to avoid serious optic atrophy. In the South Sudan systematic search for and treatment of all sleeping sickness cases in camps has enabled the disease to be practically stamped out.

KALA-AZAR

The treatment of kala-azar has been greatly improved by the substitution of less toxic and more effective pentavalent antimony preparations discovered

by chemotherapy. A number of these have been carefully tested in the hospital of the Calcutta School of Tropical Medicine, and I. E. Napier has established that the best of them is neostibosan. He recommends daily doses of 0.2 to 0.3 gramme intravenously for ten days which will cure this formerly intractable and very fatal disease, with the result that the former case-mortality of 96 per cent in the Assam epidemic form and of over 80 per cent in the sporadic form of Bengal and other areas has been reduced to under 10 per cent. Moreover, by systematic search for and treatment of all cases in some villages the early incidence has been reduced from 121 and 127 in the first two years to 8 and 3 respectively in the fifth and sixth years; so with a sufficient staff it could be eradicated.

AMOEBIASIS

This is yet another example of the discovery of further effective drugs in the last decade; although emetine retains its place as the most active one in rapidly clearing up the primary symptoms, though not infrequently followed by relapses, in the case of amoebic hepatitis it is now generally agreed that it is still the only reliable quickly acting remedy. The value, in addition to the proof of the greater safety and efficiency, in already formed amoebic liver abscesses, of a combination of aspiration and emetine in place of the old deadly open operation in tropical countries, is testified to by the fact that an average yearly death rate of 98 from liver abscess in the British Army in India, in the decade up to 1907, has been succeeded by the absence of a single death from this cause in three consecutive recent years. Recent search for methods of preventing relapses of amoebic dysentery after emetine treatment has led to the trial of a number of arsenical and other preparations, and Acton and Knowles in Calcutta have found that the alkaloids of the old Indian remedy, kurchi bark from *Holarrhena anti-dysenterica*, is effective *in vitro* against the *E. histolytica*, but is too irritant intramuscularly, so Acton advises kurchi bismuth iodide orally. The arsenical preparation, stovarsol, is also of value to supplement emetine and has a tonic action. An expensive drug, yatren, has been much advocated by German writers in both amoebic and bacillary dysentery without much scientific basis, and A. C. Reed in America, and others, have found it of little value; but recently the last-named observer has found a new arsenical preparation, carbarsone, to be less toxic and more effective than other arsenical drugs in bringing about lasting good results in amoebic dysentery. It is given in 0.25 gramme doses twice daily for ten days in gelatine capsules, or it can be administered as an enema containing 2 grammes in 200 c.cm. warm 1 per cent sodium bicarbonate; toxic effects have not been observed.

CHOLERA AND SPRUE

In cholera no recent advances have been made in treatment, for bacteriophage has been found to be useless and, although it is claimed to have had a preventive action in Assam when added to drinking water, it failed in Bihar, so its value is not yet established.

In the other important bowel disease, sprue, a distinct advance has been made in the dietetic treatment, for though it has long been known that fats and much carbohydrate food were not well digested by sprue patients, Hamilton Fairley has worked out on these lines high protein diets of considerable value; the most convenient form is 'sprulac', a powdered milk containing the required quantities of the various food principles, which only requires to be added to hot water to be ready for use. Further, the dangerous pernicious anaemia complication has been found to yield to liver treatment, preferably combined with iron.

LEPROSY

In leprosy the principle of injecting soluble products of the active fatty acids of chaulmoogra and hydnocarpus oils—introduced by L. Rogers in 1915 and reported by him in 1917 to be much more effectual in the early stages of the disease, which are seldom seen under a system of compulsory segregation—is now in general use by injection in all parts of the world, either as the original sodium salts, such as alepol, ethyl esters as used since 1919 on a large scale by Dean and Hollmann in Hawaii, and by others in the Philippines or as cresoted pure hydnocarpus oil of Muir, which is the most economical plan. During the last few years Philippine observers have shown that the best result can be obtained by injecting ethyl esters directly into the skin lesions in drop doses in numerous places at one sitting. The improved treatment has led to a highly beneficial modification of rigid compulsion in a number of countries to enable early amenable cases to be attracted for treatment at outpatient clinics, and about 100,000 cases are being so dealt with at very slight cost yearly in India alone. In tropical Africa, with available land, the colony system, to allow the patients to be largely self-supporting while under treatment, is proving very successful. Some of the gold preparations used in tuberculosis have been tried in leprosy with variable results, but krysolgan appears to be of value intravenously in eye complication as advised by W. H. Hoffman. By seeking out and treating early cases among the household contacts of known lepers it should be possible to prevent the large majority of new cases going on to an advanced infective stage, only a small number of which are curable, and as patients with advanced infection rarely live and retain their infectivity for more than ten years, the systematic use of this plan might soon reduce the remaining sources of infection to easily controllable proportions, and so in a decade or two render the task of nearly eradicating leprosy much simpler.

YAWS

In the widespread yaws of the tropics the salvarsan group of remedies retain their position, but owing to their cost being prohibitive in the scores of thousands of cases requiring treatment yearly in extensive areas of Africa, Oceania and elsewhere, the far cheaper bismuth preparations have proved of immense service, such as bismuth tartrate of sodium and potassium in 0.2 gramme doses in freshly prepared boiled solutions intramuscularly at a cost of one-tenth of a penny per dose, or 6-grain doses of sodium bismuth tartrate. Other bismuth preparations are under trial, but further evidence about them is required.

DIETETIC DISEASES

There has been more theoretical discussion on ætiology than practical therapeutic progress during the last few years on beriberi and pellagra. It has been claimed that the latter is related to a deficiency of vitamin B₃, and Harriette Chick holds that the facts may best be explained on the hypothesis that some toxic substance derived from maize may be rendered harmless by the action of pellagra-preventive P-P factor, or vitamin B₃, in yeast, liver, milk and meat which are effective pellagra-preventing foods.

HELMINTHIC DISEASES

No very outstanding discovery has been made in the last few years in the treatment of helminthic diseases, but useful work had been done on the detailed use of well-established remedies with a few useful modifications. In hookworm disease a combination of safe doses of the two active remedies carbon tetrachloride and oil of chenopodium, or its active principle ascaridol, has proved to be best for use on a large scale; for example, a maximum dose of

2 c.cm. in adults of a mixture of 40 per cent oil of chenopodium and 60 per cent of carbon tetrachloride was given to 250,000 persons by H. R. O'Brien in Siam without a death due to the drugs. Recently tetrachlorethylene has been tried in Calcutta and found to be less toxic and safer in alcohol than carbon tetrachloride. It can be given in a 4 c.cm. dose with 1 c.cm. of oil of chenopodium well shaken up in two ounces of saturated magnesium sulphate at a cost of one half-penny. In schistosomiasis tartar emetic intravenously, and emetine intramuscularly in young children with small veins, hold their own, and the newer pentavalent antimony preparations do not appear to present any advantages, and are much more expensive.

ULCERATIVE CONDITIONS

Tropical ulcerative conditions of various kinds remain to be mentioned. In *oriental sore* due to *Leishmania tropica* tartar emetic and emetine hydrochloride are still commonly used, and another effective method is to inject around the margin of the sores two or three times weekly $\frac{1}{4}$ grain doses of berberine sulphate in 1 c.cm. sterile water. In the common sloughing *tropical ulcer* striking results have recently been reported in Uganda following the daily intravenous injection of 15 grains of calcium chloride in 10 c.cm. water in adults. In *velvet sore* the discovery of diphtheria bacilli has led to the effective use of the serum. In *climatic bubo* Hanschell has reported good results from protein shock produced by the intravenous injection every third day of from 100 to 500 millions of dead typhoid bacilli.

Artificial Pneumothorax

By J. ARTHUR MYERS, M.D.

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METHOD OF ADMINISTRATION

In collapsing the lung by this method, pure nitrogen, pure oxygen, carbon dioxide and sterile air have been used. Although these gases in pure form may have certain minor advantages, filtered air has been found to be the most practical and satisfactory.

Simple and inexpensive devices can be made or may be purchased for the administration of air into the pleural cavity. These are equipped with manometers that determine when the point of the needle is in the pleural cavity. When one is certain of this fact, a small amount of air, approximately 25 c.cm., is allowed to flow into the pleural cavity. If the manometer shows that the pressure is still definitely negative, another 50 c.cm. of air may be introduced. If the manometer readings are still good, one should continue to introduce small amounts, watching the manometer readings until approximately 200 to 250 c.cm. has been introduced. This amount suffices for the initial treatment in the case of an adult and should be decreased for children, according to the size of the chest. The second treatment should be administered in approximately forty-eight hours, and here again, with the same meticulous care, one should introduce only small amounts of air between manometer readings until approximately 300 c.cm. has been introduced, provided the pressure remains negative. The third treatment is administered about seventy-two hours after the second; the fourth about five days after the third. The subsequent treatments may be administered at weekly intervals. Later, many patients may have their intervals increased to ten days or two weeks. However, this must be determined by the rapidity with which the air is absorbed from the pleural cavity and by the degree of collapse one desires to maintain. When no adhesions are present, the lung collapses to

the desired degree without the use of positive pressure. When adhesions are present, one is justified in using slight positive pressure after the patient has been on treatment for some time.

Some workers later use high positive pressures in order to stretch the adhesions sufficiently to permit a satisfactory collapse. Others prefer never to use more than a slightly positive pressure because of the possibility of tearing adhesions.

COMPLICATIONS

The passing of a needle through the chest wall for the purpose of introducing air into the pleural cavity is attended by some dangers, which must be recognized by every physician administering this form of treatment. The first is that of gas embolus, which may result if the tip of the needle is in a pulmonary vessel when air is introduced. This accident may be avoided by refraining from the administration of air until the manometer readings indicate with certainty that the point of the needle is in the pleural cavity. Probably a far more common cause of gas embolus is the giving way of an adhesion at its pulmonary attachment, resulting in the tearing of pulmonary vessels in which there is negative pressure. Thus, air that has been introduced into the pleural cavity is readily sucked into these vessels and may be transmitted to the coronary or cerebral arteries. This is a most distressing complication and sometimes is fatal. Fortunately, it occurs rarely. In the administration of approximately 20,000 treatments during the past fourteen years I have seen five cases of gas embolism, only one of which was fatal. The last one occurred six years ago.

Another complication is spontaneous accidental pneumothorax. This may be due to injury by the needle of the visceral pleura and pulmonary tissue immediately subjacent, thus allowing air from the lung to leak into the pleural cavity. The more common cause of this complication is the giving way of an adhesion at its attachment to the visceral pleura, thus producing a fistula through which air passes from the lung to the pleural cavity. Again, spontaneous collapse of the contralateral lung is occasionally seen. Such accidents may occur at any time during the administration of treatment or during the interval between treatments. When the lung spontaneously collapses suddenly and a flap of visceral pleura serves as a valve to prevent the return of air from the pleural cavity to the bronchial tree, relief must be provided by removal of air in a short time to prevent death. I have seen only two patients who I believe died from spontaneous or accidental pneumothorax. In both, death occurred within a few minutes after the onset of symptoms and before a physician could reach them. Although there was no post-mortem examination and other physicians are inclined to believe that each patient died of cardiac failure, I am still of the opinion from the symptoms described by members of their families and other associates that death was due to spontaneous pneumothorax.

Another complication is fluid in the pleural cavity. Small serous effusion is seen very frequently in artificial pneumothorax patients. It probably would be found in every case if one searched diligently and persistently enough for it. The serous fluid that lubricates the pleural layers gravitates to the most dependent part of the pleural cavity when air is introduced. Such effusion is of no significance. Large serous effusion occurs less frequently. It is often accompanied by symptoms that closely simulate those of influenza but usually persist longer. After the symptoms subside, the patient regains strength and a sense of well-being in a short time. If not aspirated, the fluid may remain for weeks or months and apparently favours the formation of obliterative adhesions, which may make further treatment impossible. Fibrin bodies in the fluid are observed in some cases and cast dense shadows on the x-ray film.

Some large effusions that appear to be only serous in the beginning are later found to be infected with tubercle bacilli or other pyogenic micro-organisms, or both. Thus, empyema becomes a complication that is most serious when it is due to mixed infection. Empyema rarely if ever results from micro-organisms reaching the pleural cavity through the needle. The cause of tuberculous empyema is obvious. Mixed infections usually result from pleural fistulas, which allow pyogenic micro-organisms to pass from the lung into the pleural cavity.

When instituting artificial pneumothorax, one must keep under close observation the mediastinum, since in some persons it is very flexible. This may result in considerable respiratory and cardiac embarrassment. In some cases mediastinal hernia is seen. When the mediastinum is too flexible to allow satisfactory collapse of the diseased lung, there are methods of stabilizing it, such as the introduction of oil into the pleural cavity.

Occasionally febrile reactions result from artificial pneumothorax treatment. They are probably due, for the most part, to increased absorption of toxins as a result of the collapse of the diseased area. These usually are not serious and disappear in a short time.

During and immediately following the first treatment, the patient may experience a sensation in the chest that is difficult to describe but is often spoken of as 'heaviness'. This is not significant and usually lasts only a few minutes to an hour or so. During the first twenty-four hours after the first treatment there may be discomfort in the chest, which varies in intensity from a slight ache to excruciating pain. This is caused in most cases by adhesions. The pain may be controlled by codeine. Usually it is not present following subsequent treatments.

In some cases, when artificial pneumothorax is attempted, pleural adhesions are encountered. They may vary in size and extent from those which completely obliterate the pleural space to those which are only thin strands and stretch to such an extent that satisfactory collapse is obtained. Between these extremes are seen adhesions, which become definitely stretched but not enough to permit the closing of cavities or adequate collapse of the diseased area to allow a good clinical result. In many such cases, intrapleural pneumolysis is practised with great success. The adhesions are cauterized near their attachment to the parietal pleura, following which the lung often collapses in a satisfactory manner as artificial pneumothorax is continued.

In an occasional case, during the first few hours of treatment, air leaks through the needle track and causes subcutaneous emphysema. This is of no significance but may cause the patient some discomfort and considerable alarm. After the first treatment is administered, the physician should take time to discuss the various possibilities with regard to pain, subcutaneous emphysema, and so on. If this is not done, the patient's confidence may be lost if some of these possibilities actually occur.

EFFECT ON NORMAL AND DISEASED LUNG TISSUE

Since artificial pneumothorax was first instituted, much has been learned about its effect on normal as well as on diseased lung tissue. Through observations it has come to be looked on as a simple procedure rather than a drastic one, as it was at first thought to be. Careful observations have revealed the fact that no serious harm comes to normal lung which is kept under a state of collapse over a long period of time. Gardner has shown that alterations resulting from collapse of the lung consist of the development of fibrous tissue in the pleura and connective tissue coats of the blood vessels and bronchi. The degree of permanent changes caused by artificial pneumothorax in fifteen cases studied pathologically was found to depend on the extent and degree of injury by the tuberculous process. There are slight changes

in the circulatory system when artificial pneumothorax is instituted, but they are harmless. The slight deviations from normal sometimes observed in the electrocardiogram are due to pleural and mediastinal adhesions that have altered the position of the heart rather than to myocardial factors. Basal metabolism is not altered in a significant way. Therefore, artificial pneumothorax can no longer be looked on as a drastic procedure when indicated in the treatment of pulmonary disease. Of the various forms of collapse therapy, artificial pneumothorax is the simplest and yet the most effective.

Fortunately, diseased areas in the lungs, except consolidations, dense fibrosis and the like, collapse more readily than normal areas, owing to the fact that in such areas there is little or no diminution of contractility but marked impairment of expansibility. Thus, selective collapse actually occurs. This makes it possible in many cases to keep the diseased area well collapsed while a considerable part of the normal lung tissue is functioning.

ARTIFICIAL PNEUMOTHORAX IN DIAGNOSIS

Since artificial pneumothorax is a simple procedure and when carefully performed does no harm, it has been found to be a very valuable diagnostic procedure, especially in diseases of the mediastinum, pleura, lungs, ribs and chest wall when obscure conditions exist. It has been used to determine definitely whether interlobar empyema exists and whether true cavity formation is present in the lung, as well as in mapping out other pulmonary conditions.

ARTIFICIAL PNEUMOTHORAX IN TREATMENT

Pulmonary tuberculosis.—Formerly the indications for artificial pneumothorax were hæmorrhage, cavity formation, or extensive disease involving one lung. In recent years the indications have been extended. Not long ago a small area of disease in the opposite lung was looked on as a contraindication to artificial pneumothorax. However paradoxical as it may seem, disease in the opposite lung often improves following the institution of artificial pneumothorax on the side of the more extensive disease. Such improvement is probably due to several factors: First, by reducing the toxæmia the patient's general condition is definitely improved, giving the body a better chance to control the lesion in the contralateral lung. Second, the sputum is soon rendered negative or entirely disappears, so that the feeding of the opposite lung and other parts of the respiratory tract with tubercle bacilli is discontinued. Third, the effect of pneumothorax is not confined to the lung being treated but has a slight immobilizing effect on the opposite lung. In case the disease in the opposite lung does not come under control or in case a new lesion appears in it, partial bilateral artificial pneumothorax may be instituted with a good deal of success. The reserve lung capacity is so great that it is possible to collapse each lung to about one-half its volume without causing dyspnoea or other discomfort to the patient. A good many workers now look on minimal, progressive pulmonary tuberculosis of the reinfection type as a definite indication for artificial pneumothorax. Conditions that were formerly thought to be a contraindication, such as tuberculous laryngitis and enteritis, are no longer considered so, as they may improve if the pulmonary lesion is brought under control. Even in cases of co-existing pulmonary carcinoma, artificial pneumothorax may render the patient's sputum negative until death results from malignancy. Diabetes is not a contraindication; in fact, many diabetic patients with co-existing pulmonary tuberculosis now have their diabetes treated successfully by modern methods and their pulmonary lesions brought under control by artificial pneumothorax. One of my patients has been under treatment for both conditions since 1925.

The main contraindications for artificial pneumothorax are cardiac disease, asthma, severe grade of

emphysema with markedly reduced vital capacity, and extensive bilateral tuberculosis.

Rest has long been looked on as the most important factor in the treatment of a tuberculous lesion in any part of the body. Strict bed rest alone reduces the activities of the lungs very slightly. They continue breathing at the rate of approximately 25,000 times a day. This probably is one of the reasons why bed rest alone so often fails. With satisfactory collapse by artificial pneumothorax, the diseased organ is actually at rest. This treatment has two main effects on pulmonary tuberculosis. First, the growth of tubercle bacilli is definitely inhibited. Second, venous stasis and some blocking of the lymph circulation occur, which are believed to stimulate the growth of connective tissue and aid in healing. Thus, it is well known that the two factors so significant in the control of tuberculosis are present; namely, the inhibition of proliferation of tubercle bacilli and the stimulation of fibrosis. Relief from symptoms, such as cough and expectoration, fever, increased pulse rate and impaired digestion, is very quickly experienced in many cases.

When cavities are present and their walls are not too thick, artificial pneumothorax closes them by bringing the walls in apposition where they become adherent and are permanently obliterated. Thus artificial pneumothorax is a simple, harmless procedure and yet most effective in the treatment of pulmonary tuberculosis.

Unfortunately, most of the results of artificial pneumothorax treatment observed to date dealt with cases that were moderately or far advanced when the treatment was begun. The first object of artificial pneumothorax treatment is to render the sputum negative or to prevent a case with negative or no sputum from becoming positive, thus protecting the patient as much as possible against endogenous reinfection and protecting his associates and the community against contamination with tubercle bacilli. By the time the disease has become moderately or far advanced most patients have positive sputum, whereas in the minimal stage this is true of only approximately one-third.

The Committee on Treatment of the American Sanatorium Association, consisting of Douglass, Peters and others, found that at the termination of artificial pneumothorax as recommended by the physician 66.1 per cent had negative sputum, whereas among those whose lungs re-expanded before their physicians recommended it only 46.9 per cent had negative sputum. A much higher percentage would have had negative sputum if the treatment could have been instituted while the disease was in the minimal stage. They classified 405 patients with reference to sputum at the termination of treatment according to the condition of the treated lung before collapse. Approximately 11 per cent more were negative when slight or no cavitation was present before treatment was begun than among those who had definite cavity formation. Thus, the less disease and destruction done before the lung is collapsed, the better the chances of rendering the sputum negative to tubercle bacilli.

In most groups of cases reported, those in which collapse was possible have shown a 20 per cent or more better chance of becoming well or able to work than those who were not treated by this method. Thus, the treatment is very much worth while even in moderately or far advanced cases, yet many such cases require long periods of bed rest in addition to artificial pneumothorax treatment.

Although the treatment of moderately and far advanced cases by pneumothorax has been found to be far superior to previous forms of treatment, such as strict bed rest, still it was not entirely satisfactory because the patients had often lost their best chances of recovery before the treatment was begun. Therefore the results obtained leave much to be desired. Moreover, when cavities have been formed, a high percentage of patients were disseminating tubercle bacilli to their associates.

Many artificial pneumothorax workers are now of the opinion that this form of therapy is most valuable for patients with minimal lesions. In the past, such lesions have been diagnosed so rarely, and when found so many workers believed that pneumothorax was too drastic for them, that very few reports show the results of artificial pneumothorax on minimal lesions. However, with modern methods of diagnosis, including the tuberculin test and the x-ray film, particularly when used as a part of the periodic examination in the physician's office and in special case-finding campaigns, the percentage of cases found presenting minimal progressive pulmonary tuberculosis is definitely increasing. The disease is found before it has produced symptoms, before great destruction of lung tissue has occurred and before tubercle bacilli are being eliminated. In these cases, physical signs usually are absent. The diagnosis is made largely by the tuberculin test and the roentgen examination. One is not justified in instituting artificial pneumothorax every time a shadow, minimal in extent, is found in the lung. The roentgen examination is not sufficiently refined to determine on first examination with a high degree of accuracy whether the lesion is of long standing and well controlled or is recent and progressive. To collapse a lung containing the former type of lesion is to do definite injustice to the patient and much unnecessary work. Therefore, before instituting collapse therapy one should keep the lesion under observation long enough to determine that it is progressive. Whenever this fact is established, no matter how small the lesion, it is none too early to institute artificial pneumothorax. To wait until the disease has become extensive, cavities have formed and adhesions are binding the lung at least in part to the chest wall is just as ridiculous as to wait until the appendix has ruptured before performing appendectomy.

I now have approximately fifty patients under observation whose artificial pneumothorax was instituted when the disease was minimal. To date, the results in this group are superior to those in other groups under my care who had artificial pneumothorax instituted after the disease had become moderately or far advanced. The results are also superior to those of other groups of minimal cases whom I have observed as they were treated by bed rest alone. I am convinced that, if the lesions are minimal when the treatment is begun, strict bed rest is necessary for only a short time, if at all, and in most cases the period of hospitalization when necessary can safely be limited to a few weeks. Thus, from the standpoint of rendering the sputum negative, of obtaining good results, that is, restoring good working capacity in a high percentage of cases and saving of the patient's time, the earlier in the course of the disease the treatment is begun, the better.

Any physician practising artificial pneumothorax therapy to a considerable extent will be confronted with lesions in all stages from minimal to far advanced. The answer to the frequently asked question when should artificial pneumothorax be instituted is to attempt it in all unilateral cases at the earliest possible moment after the disease is known to be progressive, no matter how minimal or how advanced except when the foregoing contraindications are present. When both lungs are involved, that of the more extensive and progressive disease should be collapsed, provided the better lung is or becomes sufficiently clear to carry on the necessary respiratory functions. The physician frequently meets considerable disappointment, since a fair percentage of patients in whom artificial pneumothorax is definitely indicated as determined by the extent of the lesion have extensive or complete obliteration of the pleural cavity through the development of adhesions. For this group, strict bed rest is indicated and should be supplemented by phrenic exeresis, extrapleural thoracostomy and extrapleural pneumolysis if necessary. Even though the prognosis is not

as favourable in far-advanced cases, artificial pneumothorax should be attempted when the better lung appears sufficiently free from disease. Good results are obtained in enough such cases to justify giving every patient the advantage of a trial of artificial pneumothorax. Obviously, the less extensive the disease, the better the general condition of the patient; and the fewer the extrapulmonary complications, the better is the patient's risk.

When one sees the mother with extensive pulmonary tuberculosis, first detected by reason of symptoms a few days or a few weeks after delivery, one can be reasonably certain that the disease did not develop suddenly; that in all probability it had been present in a detectable form long before the pregnancy began. Therefore, many disasters can be avoided when all physicians insist on a careful chest examination, including the x-ray film, of every pregnant woman as early in the course of pregnancy as possible. In the Minneapolis General Hospital and Minnesota General Hospital, there is close co-operation between the obstetric and the chest services. Every woman who presents herself for obstetric care is referred to the chest clinic, where the tuberculin test is administered and x-ray films of the chest are made of all positive reactors. Obviously, if the private practitioners of this country, who do the bulk of medical work, will adopt the same procedure, they will be rewarded many times for their effort through finding in the chest of pregnant women tuberculous lesions previously unsuspected. Often these lesions can be successfully treated by artificial pneumothorax and the pregnancy allowed to continue without any harm to the mother. In our experience, delivery is not rendered more difficult after the institution of artificial pneumothorax. The mother's sputum is prevented from becoming positive or, if positive when the lesion is detected, it may be rendered negative. Although it does not seem wise for such mothers to nurse their infants, they may remain in the home as safe associates of their families. The physician who detects and treats such cases renders a service of inestimable value to the patient, the family and the community. He not only often saves the mother's life or prevents a long period of invalidism, but he protects her children, her husband and many members of the community against contamination with tubercle bacilli.

In the past, artificial pneumothorax has been used very extensively among ambulatory patients. However, most of these patients were submitted to a long period of bed rest after artificial pneumothorax had been instituted. They were later allowed to become ambulatory and return to work, while the artificial pneumothorax treatments were continued. In recent years it has been found that many patients with pulmonary tuberculosis may have artificial pneumothorax instituted without being subjected to strict bed rest, or at most to a few weeks of such rest, while the treatment is being instituted. Reports of the results of such treatment coming from various parts of the world, including a few centres in this country, are very encouraging. Patients on ambulatory treatment from the beginning must be very carefully selected. They will be found among individuals who have minimal or moderately advanced unilateral lesions which are definitely progressive but which have not yet caused serious illness. There should be no significant tuberculous or non-tuberculous complications. The sputum may be negative or positive. If it is negative or none is present, one may direct the disease toward healing rather than let it go on progressing. If it is positive, collapse will often render it negative or entirely absent in a short time. The physician often sees patients with advanced disease, mostly unilateral, who refuse hospitalization or do not require it; that is, their general condition is good, they have reasonably good working capacities, but there is always the danger of their bacilli spreading to other parts of the body and to their associates. To collapse the diseased lungs of

such patients while they remain ambulatory is a service not only to them but to their communities.

Tuberculosis is frequently seen among elderly persons. While the disease may not cause them serious illness and may not cut short their lives, it may be very dangerous to their associates. In such cases artificial pneumothorax, when possible, protects the community against the spread of their tubercle bacilli while the patients remain ambulatory.

Thus there is a considerable percentage of patients with pulmonary tuberculosis who may now be treated with a short or no period of hospitalization. They avoid the mental complications that so frequently develop from long periods of hospitalization, they are permitted to enjoy their homes, and they continue their earning capacity. We now have under treatment approximately seventy-five such patients who in times past, when we believed it was necessary to hospitalize them, would have cost the taxpayers approximately \$75,000 a year. To date, the results have been as good as those obtained in other cases that were treated both by strict bed rest and by collapse. Moreover, the extension of this work to large numbers of patients makes available beds in institutions, where patients with disease so advanced that it cannot be treated successfully may be isolated.

Artificial pneumothorax is indicated in children only when the lesions are of the reinfection type. Unfortunately, unless tuberculin tests have been administered periodically it is difficult to differentiate between the lesions of the first infection type in the inflammatory stage and lesions of the reinfection type in the infiltrative stage. However, a period of observation often aids in such differentiation. Lesions of the first infection type usually cause slight or no symptoms. They reach their maximum development in a short time, remain stationary, and then begin to resolve, whereas lesions of the reinfection type usually show a tendency to increase in size sooner or later, cause symptoms and present definite evidence of fibrosis, cavitation or other complications. However, paradoxical as it may seem, in some cases of reinfection, there is rarely, if ever, any danger of other conditions. There is rarely, if ever, any justification for inducing artificial pneumothorax in the case of a child who has the first infection type of tuberculosis. This statement applies also to the first infection type of tuberculosis in adults. Among 149 children whom we have observed with the first infection type in the inflammatory stage over a period of one to twelve years at the Lymanhurst School, we have not instituted artificial pneumothorax in a single case. When the lesion is found to be of the reinfection type and is demonstrated to be of a progressive nature, no matter how small it is or how young the child, artificial pneumothorax is recommended. This procedure does not lead to deformity unless complications arise, such as empyema; therefore one need have no hesitancy in administering artificial pneumothorax during the period of childhood.

The question which artificial pneumothorax patients most frequently ask the clinician is when may I discontinue the treatments? Unfortunately, symptoms, physical signs and x-ray films are not safe criteria in answering this question. No one can determine with certainty when the tuberculous lesion is so well under control that it will not reactivate if allowed to re-expand. In the earlier days of this work, the lung was usually allowed to re-expand too soon. The disappearance of symptoms and the marked improvement in the patient's general condition led to a false sense of security on the part of the patient as well as of the physician. Experience soon taught us however that, if permanent results were to be obtained, the lung should be collapsed over a long period. No one can lay down a rule as to just how long the treatment should be continued. This is a problem that must be solved for each individual patient. It must depend on several factors, such as the extent of disease when the treatment is instituted, size of the cavities, presence of tubercle bacilli in the sputum, tuberculous and non-tuberculous complications, and the patient's general

condition. In minimal cases one hesitates to allow the lung to re-expand in less than two years. In moderately or far advanced cases the lung should be kept collapsed for a period of at least three to five years and in many cases much longer; in fact, when large cavities are present and the involvement is extensive when the treatment is instituted, it is doubtful whether the lung should ever be allowed to re-expand. The red cell sedimentation rate, as recommended by such workers as Cutler, may prove a valuable index on this subject. He is of the opinion that, by observing this rate carefully and periodically throughout the course of treatment, one can determine with a reasonably high degree of accuracy when the lesion is well under control.

A very unfortunate fact about artificial pneumothorax work is that one is not able in all cases to continue the collapse as long as one desires. In a fair percentage of patients, adhesions develop in the pleural cavity and finally obliterate the pneumothorax space. The development of such adhesions may be rapid, so that the space is lost in a short time, or it may be slow, thus permitting one to continue the treatment with a partial collapse over a long period of time. When it is obvious that such adhesions are developing, particularly if the space is being lost fairly fast, oleothorax should be instituted at once. In such cases gomenol (an oil obtained from *Melaleuca viridiflora*) may be used, although many workers are of the opinion that sterilized liquid petrolatum or olive oil has an equally good effect. Thus, through the replacement of air with oil, further development of the obliterative adhesions is prevented or definitely retarded and the lung may be kept collapsed over the desired period of time. Because of complications that sometimes arise with oleothorax, it is not yet considered a substitute for artificial pneumothorax except in special cases.

Other pulmonary and bronchial conditions.—Artificial pneumothorax has been used to some extent in the treatment of bronchiectasis and pulmonary abscess. Although it has not been found as valuable in these conditions as in pulmonary tuberculosis, it is very much worth while in properly selected cases.

Lobar pneumonia.—One of the recent developments in artificial pneumothorax work has been its administration to patients suffering from lobar pneumonia. In 1921 Friedman reported the results of artificial pneumothorax in seven cases of pneumonia. Since that time, several workers in other countries have used it and the reports to date, although they cover a limited number of patients, are very encouraging. The more recent observations were reported by Coghlan in January 1932 and by Li in September 1932. Each treated six cases. The treatment resulted in almost immediate relief of symptoms, such as fever and pain. In short, artificial crises appeared soon after the treatment was instituted. In fact, fifty cases have been reported in other countries, with forty-seven recoveries.

In this country, Moorman of Oklahoma City instituted artificial pneumothorax in the treatment of two cases of pneumonia in 1930. Lieberman and Leopold of Philadelphia reported the results of their work on therapeutic pneumothorax in experimental lobar pneumonia in dogs in March 1934. They produced lobar pneumonia in thirty-six dogs, eighteen of which were used as controls and eighteen were treated by artificial pneumothorax. Of the treated dogs, fifteen recovered and three died; of the untreated dogs, five recovered and thirteen died. Two of the treated dogs probably died from another cause; thus, the results of treatment were exceptionally good. Of this work Stengel says:

These results were so confirmative of the clinical experiences reported by several persons . . . that we proceeded to try the treatment in man.

Again he says :

While this method seems to be a step of value in the treatment of pneumonia, I think it should be emphasized and re-emphasized that this is not a treatment which in the state of our present knowledge should be regarded as applicable to influenzal pneumonias or diffuse streptococcal pneumonias, nor should it be used, in my opinion, in any case of pneumonia that is recognized at the time as being in any degree bilateral, even with a small lesion on the opposite side.

In May 1931 Blake of New Haven reported his results in the treatment of twenty early cases of pneumococcal lobar pneumonia by artificial pneumothorax on or before the fourth day of disease. Eleven of his patients had a free pleural space, and all recovered promptly by crisis or rapid lysis with no complications except a sterile pleural effusion in one. In the remaining nine cases, pre-existing pleural adhesions were present, which prevented adequate collapse. Although none of these patients died, the disease appeared to run its natural course and two developed empyema.

In June 1931 Behrend and Cowper reported the results of treating eleven patients with unilateral lobar pneumonia by artificial pneumothorax. Nine patients recovered, and two died, but neither of the fatalities could be directly attributed to the pneumothorax.

Stengel says :

The very prompt development of a crisis in patients with marked but early lobar pneumonia and the almost immediate improvement in all subjective symptoms is very striking. Taking all the cases together the mortality of pneumonia under this treatment will probably be distinctly limited but it is to be remembered that certain complicating conditions, such as bilateral involvement, the presence of dense pleural adhesions, etc., interfere with the appropriateness and effectiveness of the treatment and possibly these cases may also be those which contribute to elevating the mortality rate of this disease under any kind of treatment. If the mortality from pneumonia were in no degree lowered by pneumothorax, it might still be said that the prompt improvement and the speedy termination of the disease secured by pneumothorax treatment would still constitute a very decided advance.

SUMMARY

1. Forlanini in Italy collapsed a diseased lung in 1892. Murphy of Chicago in 1898 reported a group of cases treated by artificial pneumothorax.

2. Filtered air to the amount of from 200 to 250 c.c. is introduced, under carefully observed manometer readings, into the pleural cavity as an initial treatment. The second treatment is given forty-eight hours later; the third seventy-two hours after the second, and the fourth about five days later. The interval between subsequent treatments depends on the extent of collapse and the rate of absorption of air.

3. The complications are gas embolus, spontaneous or accidental pneumothorax, serous effusion, empyema, mediastinal hernia, febrile reactions, pain and subcutaneous emphysema.

4. Artificial pneumothorax has no deleterious effect on normal lung tissue or the other organs, such as the heart. Diseased tissue collapses more readily than normal tissue, so that selective collapse may result.

5. Artificial pneumothorax may be used as a diagnostic measure.

6. Hemorrhage and minimal progressive to far-advanced unilateral pulmonary tuberculosis are indications for pneumothorax. Even bilateral disease, if one lung is not too extensively involved, responds to pneumothorax treatment. Contraindications are cardiac disease, asthma, severe emphysema and advanced bilateral tuberculosis.

7. In moderately and far-advanced cases, successful pneumothorax shortens the period of bed rest necessary, renders the sputum negative, and closes cavities if the walls are not too thick. In minimal progressive lesions it prevents the sputum from becoming positive or, if positive, renders it negative and controls the disease and frequently obviates hospitalization and strict bed rest.

8. Pregnancy is an indication for rather than against pneumothorax, if the disease is discovered at that time because of the beneficial effect for the patient and the possibility of changing the sputum to negative.

9. Treatment by pneumothorax with the patient remaining ambulatory is possible for selected cases, including elderly persons.

10. Pneumothorax is indicated in children if the lesion is of the reinfection type.

11. Several factors must be kept in mind when discontinuation of pneumothorax is acceded to. Minimal cases should continue at least two years, and moderately or far-advanced cases from three to five years or even longer.

12. Oil may be substituted for air if adhesions are forming and obliterating the pleural cavity.

13. Pneumothorax is used to some extent in bronchiectasis, pulmonary abscess and lobar pneumonia.

The Treatment of Post-Operative Retention of Urine

By N. R. BARRETT, M.Chir. (Camb.), F.R.C.S. (Eng.)
(From the *Lancet*, Vol. II, 10th November, 1934, p. 1046)

THE treatment of post-operative retention of urine is often delayed and indefinite and the condition worries the patient. There are many occasions on which the worst part of an operation, in the opinion of the patient, is the period after the return of consciousness when the discomfort of nausea and vomiting is aggravated by inability to micturate.

Textbooks of surgery are unanimous in their opinion that spontaneous micturition must be established as soon as possible after operation, but the treatments they advise for those patients who have difficulty are not always immediately successful. There is no doubt that the most simple and immediate relief is given by passing a catheter, but this is seldom done because of the fear that the patient may develop cystitis and subsequent infection of the kidneys, and because it is taught that once a catheter has been passed it may be necessary to repeat the procedure on several occasions. During the past year an effort has been made in the wards of the surgical unit of St. Thomas's Hospital to determine the possible advantages of using a catheter whenever it may be necessary, and to estimate the dangers to which the patient is exposed as a result of this practice. Incidentally certain other features were investigated and some will be briefly considered.

In a control series of 414 patients operated upon for general surgical conditions, the incidence of post-operative retention was 9 per cent in males and 7 per cent in females. The patients with retention were treated by giving hexamine grs. 15 and repeating the mixture in 20 minutes if the first dose was not successful.

It is well known that operations upon the perineum or pelvic organs are more likely to be associated with post-operative retention than any others because relaxation of the perineal muscles is inseparably connected with the voluntary development of micturition. It has been shown that the process starts with rhythmical contractions of the bladder musculature, and this is followed by a relaxation of the internal and external sphincters. Passive increase in the intravesical pressure does not influence the sphincters, and therefore straining by the abdominal muscles is not successful as long as the sphincter supplied by the

SOME NOTABLE EPIDEMICS.—By H. H. Scott, M.D., F.R.C.P. (Lond.), D.P.H., D.T.M. & H. (Oamb.), F.R.S.E. 1934. Edward Arnold and Company, London. Pp. xix plus 272. Price, 12s. 6d.

This is another very good example of the saying 'What the eye does not see the heart does not crave', or to put it in the words of the advertising 'profession' it is a book that creates its own demand. Before we received this book, we were unaware, though others may not have been, of the serious gap in the medical literature of the day that it has now partially filled, and we have no doubt that the author has already received many suggestions that he should follow up this book by another, 'More Notable Epidemics'; the demand already exists.

The book is an anthology of recent, or, rather, comparatively recent, British epidemics. The author was lured away from his original intention of limiting the period to fifty years, that is to say to the bacteriological era, by his desire to do justice to a latter-day Hippocrates, Dr. John Snow, who has not in the author's opinion received sufficient recognition hitherto, and he has therefore included the 'Broad Street pump' cholera outbreak of 1854. John Snow was an astute observer who had the misfortune to be born a little ahead of his time; his ideas regarding the spread of cholera and other epidemic diseases were considered 'peculiar' in his day, but time has shown that they were strikingly correct.

The epidemics that are described are practically all milk-, water- or food-borne; epidemic influenza, 'the standard epidemic of Nature', is not included. The author's viewpoint is the present and he has not attempted to correct the perspective, otherwise he would not have included the Holborn and St. Pancras 'Sonnet' outbreak of 1933; in this 13 persons were attacked and only two died. This comment is not made in any spirit of criticism, as this outbreak is a good example of a food-borne epidemic; it was due to individual carelessness and some laxity in the preparation of food in a food shop. It is also an example of a piece of medical detective work that could not possibly have been carried through without the aid of bacteriology.

To Dr. Harold Scott, sanitarians throughout the world, and especially those in the tropics, owe an insoluble and steadily-mounting debt, not only for this recent contribution but for many others and particularly for his invaluable annual summaries of colonial medical reports. It may reasonably be claimed that he is one of the leading medical writers of the day, and as such he is certain to attract the envy and spite of the lesser fry amongst this community; he will therefore understand how to treat the following carping criticism of a disappointed admirer:—The impression that we gained from reading the introduction was that, after finishing the book proper, the author decided that he must write an introduction of about ten pages and proceeded to cover these in a very tired manner. The mental processes that preceded his choice of material for inclusion in his anthology may have been interesting to him, but are very boring to the reader who is interested only in their result, and his summary of the nineteen chapters seems to us quite unnecessary; there is a full contents list. The facetiae that are introduced here and there throughout the book are often forced and inappropriate. We appeal to Dr. Scott, the master of compression, to turn to page 2 of his book and say whether he really considers that the book would be one scrap the poorer if he had omitted the six central paragraphs of this page; 'prolixity and vain repetition' are his own words. With the exercise of economy of words room might have been made for a few more notable epidemics without increasing the length of the book. Then, on a point of accuracy, surely it was in 1883 and not in 1886 that Koch discovered the cholera vibrio? Finally, we think that

he might have spared us the cacophonous phrase 'epidemiologically epochal'.

Nevertheless we will repeat, not vainly we hope, that Dr. Scott has made another invaluable contribution to medical literature; this book which in places is as interesting as any detective novel should, and we think will, find a place in every medical library in this country and be read extensively.

L. E. N.

A MANUAL OF DISEASES OF THE EYE.—By Charles H. May, M.D., and Claud Worth, F.R.C.S. (Eng.). Seventh Edition, 1934. Baillière, Tindall and Cox, London. Pp. viii plus 505, with 350 figures and 23 plates. Price, 15s.

This is the seventh edition of this excellent manual which has been extensively revised and in some parts rewritten. At the same time the size of the book has only increased by 30 pages and the author of the present edition, Montagu L. Hine, F.R.C.S., has been able to make these additions by omitting parts included in previous editions.

As this is a book which is written principally for students, this is a wise procedure as the original aim of the book was to describe the fundamental facts of ophthalmology without going into detail to describe rarer conditions.

The new additions on detachment of the retina, orthoptic treatment, colour vision and contact glasses are simply and excellently described. In addition, there are numerous changes throughout the book on diseases of the lacrimal apparatus, glaucoma and cataract. As the book is extensively used in Medical Colleges in India, it is a pity that more space has not been given to certain eye diseases which are common in tropical countries, such as epidemic-dropsy, glaucoma, superficial punctate keratitis as seen in India, and leprosy. However, the book is an excellent one, and the addition of new material will increase its usefulness, and we can cordially recommend it to all medical students and general practitioners.

E. O'G. K.

CATARACT: ITS ETIOLOGY AND TREATMENT.—

By C. A. Clapp, M.D., F.A.C.S. 1934. Henry Kimpton, London. Pp. xi plus 254. Illustrated with 92 engravings. Price, 18s.

THE amount of literature that exists in reference to the normal crystalline lens and its disorders is enormous, yet it is surprising that no work in English has so far been published; for such a book there is a distinct need.

With this end in view the author has produced a very valuable and concise work. The book consists of 25 chapters which are devoted to the embryology, comparative anatomy, anatomy, physiology and chemistry of the lens, as well as to the pathology and treatment of cataract and the care of the cataract patient.

The chapters on the embryology and comparative anatomy of the lens have been admirably written by Miss Ida Mann.

Dr. Clapp has succeeded in writing a most excellent, interesting and immensely practical book embodying facts that seem to be well established and the most approved methods of treatment.

The illustrations are excellent and numerous, and at the end of each chapter is an extensive bibliography. A work on cataract will always be of interest to medical men in India and it is a pity that no mention has been made of syphilis, malaria and ankylostomiasis in the pathogenesis of cataract, as these diseases are common causes of toxic cataract in India. The treatment of monocular cataract has also been overlooked.

The author deserves the greatest praise on the excellence of his work which will be found of great value to ophthalmologists as well as to medical men

in general, for the treatment of cataract forms a large part of the daily routine of the surgeon working in India, and we strongly recommend the book to all who are interested in this fascinating branch of surgery.

E O'G. K.

DISEASES OF THE SKIN. (CATECHISM SERIES).

—By J. F. Smith, M.A., M.B. Second Edition. E. and S. Livingstone, Edinburgh. Pp. 86. Price, 1s. 6d. Postage, 2d.

This is an outline of the bare essentials of diagnosis, treatment, etc., of skin diseases arranged in the form of question and brief answer. The book is only of use for students for the purpose of rapid revision before an examination, and only those students will be able to benefit from its use, who are endowed with the faculty of rapidly committing to memory anything they read, for there are no explanatory passages, typical examples and cases quoted which serve to fix facts in the mind of the average individual.

P. A. M.

A MANUAL OF MENTAL DISEASES. A TEXTBOOK FOR STUDENTS AND PRACTITIONERS IN INDIA.

—By C. J. Lodge Patch, M.C., Major, I.M.S. 1934. Ballière, Tindall and Cox, London. Pp. vii plus 332. Price, 10s. 6d.

It is rare for a manual of mental disease to be written in a language that is readily understandable by the medical student, and by the general practitioner of medicine. It is equally rare for such a book to create an interest in the somewhat obtuse subject with which it deals and further to impress the reader with the practical professional knowledge and sound common sense which the author presents his subject. And yet this manual possesses all these characteristics. Added to this the author has the clarity of a gifted writer who has taken the trouble to weigh the value of each written word. In simple language, Major Patch describes the healthy mind and how his disorders deviate from normality. In succeeding chapters the clinical recognition, including both physical and mental symptoms, of the psychoses is clearly described. The causation of prophylaxis of mental disease with the steps which should be taken by parents, teachers, and family physicians to diminish the risk of the possible break-down in a predisposed child are adequately dealt with. The concluding chapters on diagnosis, prognosis and treatment are especially valuable. This book is described as a textbook for students and practitioners in India and admirably does it fulfil this rôle. Lucky is the student whose teacher advises him to follow this textbook along with the teacher's own prescribed course of instruction. There is no textbook in India on mental disease comparable to it in merit. Holding this view, perhaps the reviewer may be pardoned for adding a few criticisms.

It is regrettable that the author did not include a brief chapter—even if only of one or two pages—on the pathology of mental disease—covering what little is actually known and indicating what is summarized. For pathology is the foundation of all knowledge and enquiry and research would best be stimulated if the gaps in our knowledge were laid bare. The author has also deliberately excluded the psychoneuroses. His reasons were weighty—and yet such is the charm and the clarity of the author's writing that there is a distinct sense of loss at this omission. Moreover, the wide distribution of the psychoneuroses and the frequency with which the young graduate is called upon to deal with them renders it imperative that he should hear of these disorders from the physician and from the alienist alike. For the psychoneuroses form a common meeting ground on which these two groups of teachers can come to grips. It is hoped that in the next edition a few chapters or an appendix will

be added on the psychoneuroses, or, in the alternative, that the author may publish a second small volume dealing with such conditions. It would also be of advantage if a few line diagrams, such as the author probably uses in his lecture room, could be included. As has already been indicated no student or practitioner of medicine who desires enjoyment, interest and instruction should miss reading this most instructive and attractive of textbooks.

H. S.

A TEXTBOOK OF HISTOLOGY.—By A. A. Maximow and W. Bloom. Second Edition. 1934. W. B. Saunders Company, Limited, Philadelphia and London. Pp. 662 with 530 Illustrations. Price, 30s.

PROFESSOR MAXIMOW has left his mark in medical history as a cytologist of the first rank, and it is therefore fortunate that he should have left behind him when he died sufficient manuscript and notes to enable a book on histology to be published in his name. The historical value of such a book would in any case be considerable, but it is greatly to the credit of the second author that this book has proved of such practical value as well, that another edition was demanded within four years.

We are not at all surprised that this book should have proved so popular, as it is in every way a satisfactory one. The plan of arrangement usual in a book of this kind is followed. The descriptions are clear and the illustrations well chosen; the latter maintain a nice balance between realism and clarity, and the half-dozen coloured plates are especially useful.

The sections on the blood, on the blood-forming and destroying tissues, and on the spleen claimed most of the reviewer's attention. These sections are particularly good, though emphasis is usually laid on the theory favoured by the late Professor Maximow. For example, the present author is very hard on all the pluralist theories of blood formation, and one would gather from reading these sections that the unitarian theory of the common origin of all blood elements from a single stem cell, the *hemocytoblast*, was universally accepted, whereas this is not the case; the blood histocyte is looked upon as a purely pathological cell which seldom, if ever except during the agonal phase, appears in the general systemic circulation. The references to the blood-destroying tissues are perhaps not as full as one might wish for, but this is a subject on which present-day knowledge is not very complete.

The section on the spleen has been revised by Professor Talaferro; it would appear that this organ is coming to be looked upon as the special preserve of protozoologists.

The second edition contains a number of useful references; these, we are told in the preface, were included by special request. They have added considerably to the value of the book from the point of view of post-graduate readers. On the whole, it is a very excellent book and one that we can thoroughly recommend to teachers and students.

L. E. N.

A TEXTBOOK OF HISTOLOGY.—By Harvey Ernest Jordan, A.M., Ph.D. Sixth Edition. 1934. D. Appleton-Century Company, Incorporated, London. 1934. Pp. xxvii plus 738 with 610 Illustrations. Price, 30s.

THE sixth edition of this well-known textbook on histology has been thoroughly revised and brought up to date. The most extensive revisions and additions both in the text and figures are in the sections dealing with blood, the reticulo-endothelial system, the endocrine tissue, striped muscle, neuroglia, nervous tissue, the reproductive systems and the lymphoid organs. In spite of many additions the author by

judicious pruning has kept this edition within the limits of the former editions. The book will prove of great value to all students of medicine particularly to those who have some knowledge of elements of histology.

C. L. P.

A TEXTBOOK OF PATHOLOGY.—By William Boyd, M.D., M.R.C.P. (Ed.), F.R.C.P. (Lond.), F.R.S.C. Second Edition. 1934. Henry Kimpton, London. Pp. 1047 with 416 engravings and 8 coloured plates. Price, 45s.

MANY changes and additions have been made in the second edition of this excellent textbook. The order of the first part of the book has been entirely altered and many sections have been re-arranged. Certain chapters, especially those dealing with tuberculosis, immunity and allergy, and bacterial infections have been largely rewritten, and much new material has been incorporated in this edition. Major alterations and additions have also been made in connection with animal parasites, teratomas, the origin of pigmented moles, focal infection, rheumatic fever, the bacteriology of influenza and of whooping cough, the relation of cholesterol to atheroma and coronary sclerosis, silicosis, amœbic dysentery and agranulocytic anæmia. All the usual subjects are included and dealt with in an efficient manner.

A number of new illustrations have been added which greatly enhance the value of this work. We can strongly recommend this book to those who desire a thorough basic knowledge of the subject.

C. L. P.

ANNALS OF THE PICKETT-THOMSON RESEARCH LABORATORIES. INFLUENZA. PART II. Volume X, Monograph XVI.—By D. Thomson and R. Thomson. May 1934. Published for The Pickett-Thomson Research Laboratory by Baillière, Tindall and Cox, London. Pp. xix plus 916 (from 641 to 1557). Price, £3 3s.

THIS volume is the largest that has been issued by the Pickett-Thomson Research Laboratory, and it completes what must be the most comprehensive monograph on influenza yet published. The monograph consists of 1,455 pages of which about eight hundred are in this volume.

The bacteriology of influenza was dealt with in the first part of this monograph; part II deals mainly with the clinical aspects and epidemiology, and in this respect differs from the majority of the *Annals*. About three hundred pages are devoted to the sequelæ and complications of influenza; the subject of pneumonia as a sequel of influenza occupies more than a quarter of this section and is dealt with in all its aspects. There are short sections on the influence of the disease on the physiological functions peculiar to women, and on its association with pulmonary tuberculosis; it is interesting to note what a complete reversal of opinion there has been in recent years on the question of influenza as a predisposing factor in pulmonary tuberculosis. There appears to be no statistical evidence to show that 'influenza infection' does to any noteworthy extent predispose persons to tuberculosis infection.

The pathology of influenza forms another large section. In the section on epidemiological data, a very good summary of the various pandemics is given and such important subjects as the periodicity of influenza epidemics are discussed with full data collected from a number of sources; it is interesting to note which countries provide the most elaborate data. The section on the possible modes of transmission is a short and rather disappointing one. There is a section each on vaccines and sera in treatment and prophylaxis, and one on preventive measures generally, in influenza epidemics. Treatment is given a section of about

forty pages; we see that S. U. P. 36 is mentioned here, but is not referred to in the authors' summary.

The usual practice of giving a summary at the end of each section is followed, and at the end of the volume there is a thirty-page summary which the reader will find most valuable. There are about 4,500 references to the literature, and both an authors' and a subject index.

The authors undertook a colossal task and they are to be congratulated on the way they have accomplished it. They will have the satisfaction of knowing that for many years to come their monograph will be the standard work of reference on influenza, alike to bacteriologists, clinicians and sanitarians.

L. E. N.

RADIUM AND CANCER. A MONOGRAPH.—By H. S. Souttar, D.M., M.Ch. (Oxon.), F.R.C.S. (Eng.), M.D. 1934. William Heinemann (Medical Books) Limited, London. Pp. xiii plus 387. Illustrated. Price, 21s.

RADIUM has now taken so very important a place in medical treatment—in the widest sense—that the practitioner can no longer take the attitude that it is a subject entirely beyond his comprehension and one that he must leave to the specialist. We are not suggesting that every practitioner should have a gramme or two of radium at his disposal to experiment with, but he must understand something of the principles of its action and of its possibilities in the treatment of cancer, otherwise he will not be in a position to advise his patients when the occasion arises. Even the surgeon is seldom equipped with the fundamental knowledge of atomic physics that is necessary if he is to use radium intelligently, and not simply to apply it by rule of thumb.

It is very hard to acquire this knowledge in the ordinary course of events. It is not simply a matter of going back and rubbing up one's physics, as recent advances in our knowledge of atomic physics have brought about so complete a change during the last few years that the majority of us will have to commence to learn the subject *de novo*, and few can afford the time to grapple with the books on the subject written by physicists.

Mr. Souttar, a surgeon and clinician, has written a book on radium that will go a long way to get both the surgeon and the practitioner out of their difficulties. The first half of the book is devoted to the theory and the second half to the practice of radium therapy. There is no sharp dividing line and the author passes by natural stages from the atomic theory in the first chapter to the treatment of carcinoma of the cervix in the last; this blending of theory and practice is one of the outstanding features of the book.

The author has a more profound knowledge of atomic physics and mathematics than the majority of his readers will find it necessary to acquire in order to obtain a practical and useful knowledge of the subject of radium and x-ray therapy, but the early chapters are written in such a way that they will be appreciated by readers of many grades of knowledge, and all medical men should be able to grasp the salient points sufficiently to read the later chapters with a full understanding.

In order not to make the book too bulky it has been necessary to exercise selection in the chapters on the application of radium in different conditions; the subjects chosen are—tumours of the skin, and carcinoma of the tongue and lip, of the breast, of the œsophagus, of the rectum, prostate and bladder, and of the cervix uteri.

It is a book that we can unhesitatingly recommend to the surgeon, to the general practitioner, and to the student.

SEX ETHICS. THE PRINCIPLES AND PRACTICE OF CONTRACEPTION, ABORTION AND STERILIZATION.—By John Ellison, B.A., M.B., B.Ch. (Cantab.), F.R.C.S. (Ed.), F.C.O.G., A. Goodwin, O.B.E., M.D., B.S. (Lond.), F.R.C.S. (Eng.), F.R.C.S. (Ed.), C. D. Read, M.B., Ch.B. (N. Z.), F.R.C.S. (Ed.), F.R.A., C.S., M.C.O.G., and L. C. Rivett, M.A., M.C. (Cantab.), F.R.C.S. (Eng.), M.C.O.G. 1934. Baillière, Tindall and Cox, London. Pp. xl plus 281 with 19 plates. Price, 12s. 6d.

We are in entire agreement with the authors when they say that the time is long overdue for the issue of an authoritative statement on three important questions of the day—contraception, abortion and sterilization. We know what quite a number of sex-starved women think, and we have endless opportunities of reading the compilations of commercially-minded laymen, who have seen in this commendable present-day tendency towards more open discussion of sexual matters an opportunity to make money, and have flooded the market with books that are either unreliable guides or mere repetitions from the writings of pioneers such as Margaret Sanger and Marie Stopes, but we have had very little opportunity of hearing the opinions of leading men in the medical profession on these three important subjects. The extremely conservative attitude that the profession has adopted, particularly over the matter of contraception, is not on the whole likely to enhance its reputation; the medical profession has certainly maintained its dignity and allowed others to make the mistakes, but the fact remains that the attitude its thinking members are now taking, which is well reflected in this very excellent book under review, is in essentials that taken by Marie Stopes a quarter of a century ago, and it is here expressed *authoritatively* for the first time. The word *authoritatively* is, we feel, justified in view of the fact that the four writers are teachers of obstetrics and gynaecology in some of the leading London medical schools.

As the title of the book suggests it is the ethical aspect that has been dealt with primarily, but in the case of each subject there are short chapters on practical methods of choice which will be very useful to the practitioner who is often confused by the multiplicity of the methods that are suggested. The points of view of the Churches—the Anglican, the Roman and the Jewish—are given, explained and discussed. In all three matters Rome appears to take an uncompromising attitude which provides the authors with their opportunity for passing severe strictures on the reactionary tendencies of the Church in general; these are, in our opinion, not always quite fair to the Anglican Church which has shown a much more reasonable attitude, to contraception at any rate. The legal aspect is also discussed and the Law is repeatedly shown to be 'a fool'. For example, there seems to be no legal objection to the sterilization of a woman, but in the case of a man it is under certain—not very clearly-defined—circumstances an indictable offence.

The authors go into the question of extra-marital sexual relations, and in their liberal attitude in this matter they go much further than many will be prepared to accompany them; they suggest that, while there is a surplus female population, unmarried women with strong maternal instincts should be allowed to have children and that if necessary the state should support these. They also give their blessing to temporary 'companionate' marriages: at least, they say, and we quite agree with them, that these are more likely to lead to the final marital happiness than the insoluble marriage ties that some religious codes attempt to enforce.

At the end of each section there is a chapter of 'conclusions'; in these the opinion and advice of the writers are summarized. There are also a number of useful line drawings.

'The medical profession is greatly to blame for its failure to insist on a proper understanding of this subject before men and women enter into the married state, and this omission can be excused only on the grounds that up to a recent date the imparting of sex knowledge was considered indecent by a hypocritical public. That era is dying, and there is no excuse now for any medical practitioner who does not trouble to gain a thorough grasp of the psychology and physiology of sexual intercourse, and impart that knowledge to those who are going to marry'. To those whose conscience pricks them after reading this quotation, we recommend this book; it is not a complete treatise on the subject, but it is a very excellent introduction.

It is unfortunately very seldom that medical writers take the care these writers have taken, over the language in which they express their opinions; even if the subject-matter had not been interesting, the reviewer would have read this book with real pleasure.

L. E. N.

PRINCIPLES IN THE TREATMENT OF INFLAMMATION.—By T. E. Hammond, F.R.C.S. 1934. H. K. Lewis and Company, Limited, London. Pp. xii plus 209. Price, 10s. 6d.

The perusal of this book led to disappointment for in spite of its arresting title it is merely an ill-arranged and carelessly written account of some of the personal experiences and opinions of the author. At times he breaks into generalizations, which in the absence of definite figures, seem to be based on inadequate data.

The book is quite unscientific and all through it runs an undercurrent of contempt for the laboratory worker as opposed to the clinician. The author also appears to imagine that he has a message to deliver to the profession as a whole, and the message is that drugs do not act *per se* on an infecting organism but by altering the body state in some way so that it can overcome the attacks of the parasite. He returns to this theme again and again in his wanderings and accuses most of his colleagues of not recognizing this fact. The only comment on this is that if he is correct he is unfortunate in his professional associates for in the reviewer's experience few medical men nowadays consider a drug acts in the body in the identical manner in which it acts in a test-tube.

The book may be best summed up by quoting a few lines from the concluding chapter. 'Any one who reads this book will be struck by its incompleteness, for so many things are omitted and others are just touched upon. No attempt is made to give a complete account and only certain principles bearing on treatment are outlined. The points dealt with are those that I have pondered over at the bedside of my patients during the last few years. My own fragmentary knowledge is relied upon and little reference is made to the work of others'. We agree entirely with these remarks.

P. A. M.

'ANALAR' STANDARDS FOR LABORATORY CHEMICALS. 1934. Formulated and Issued jointly by The British Drug Houses, Limited, and Hopkin and Williams Limited, London. Pp. xvi plus 295. Price, 3s. 6d. per copy. Postage, 6d.

This is a publication giving an account of nearly 220 inorganic and organic compounds used as laboratory chemicals and as analytical reagents. The maximum limits of the impurities likely to be present, the physical and chemical properties and the tests for finding the limit of the probable impurities are described under each compound. The method of assay is given and some new and delicate tests have also been added. A high standard of purity is insisted upon and the book will thus be of great value not only to analytical chemists who are faced with the problem of finding the nature and extent of impurities present in some of the chemicals used either in

laboratories or in hospitals but also to research workers who look for chemicals of a very high standard of purity.

S. G.

NEW LIVES FOR OLD. HOW TO CURE THE INCURABLE.—By J. E. Barker. 1934. John Murray, London. Pp. xii plus 372. Price, 7s. 6d.

The medical profession is not infallible: it has never claimed infallibility. A patient will sometimes persist in living in the face of a fatal prognosis; this has probably happened at least once in the experience of each one of the 50,000 odd doctors on the British register. Some of these condemned patients have come into contact, or communication, with Mr. Ellis Barker, who has 'treated' them, sometimes through the post, and so Mr. Ellis Barker has written a book about them. There are not many of them, but they are a very distinguished company, as how many of us can claim, as can little Gillian, that our 'case' has occupied three pennyworth of a seven-and-sixpenny book?

We are afraid that Sir Arbuthnot Lane and Sir Herbert Barker, the writers of the first and second introductions, respectively, have snatched the very words from our mouth when they said that the book was 'a very remarkable production indeed'.

FIRST TREATMENTS IN MEDICINE.—By Colonel G. F. Rowcroft, M.R.C.S., L.R.C.P. 1934. Published by the author himself, Culmore, Coonoor, South India. Pp. 69. Price, Re. 1-6

This is a small handbook of 69 pages. According to the author it has been written 'to give the newly launched medical student a certain condensed modicum of diagnosis and treatment'. Going through its pages one cannot help feeling that it is a very poor attempt and will serve no useful purpose. When the author recommends the use of carbolic acid for the treatment of malaria and amœbic dysentery and makes no mention of the efficacy of quinine or emetine, when he recommends grey powder by mouth for treatment of syphilis in all its stages and makes no mention of any of the preparations of arsenic or bismuth, and when he believes that diphtheria can be cured by touching the patches in the throat with pure carbolic and says nothing about the value of antitoxin, one cannot commend the book as a valuable addition to medical literature. The junior members of the medical profession for whose use the book has been written will neither obtain valuable information nor anything that will help them to discharge their duties more efficiently and successfully. On the other hand those who follow some of the recommendations are likely to come to grief and lose both their patients and their reputations.

K. V. K.

STAND UP AND SLIM DOWN (BEING RESTORATION EXERCISES FOR WOMEN WITH CHAPTER ON FOOD SELECTION IN CONSTIPATION AND OBESITY).—By Mrs. E. A. Hornibrook. Sixth Edition. 1934. Williams Heinemann (Medical Books), Limited, London. Pp. xiv plus 167. Illustrated. Price, 6s.

We welcome the appearance of the sixth edition of this small book.

The adjective small is used as a recommendation, for in a surprisingly limited space the author has compressed a remarkable amount of information as to how a woman's health may be benefited by means of simple dietetic precautions and a series of well-thought-out exercises easy to perform and requiring no special apparatus. The book is very clearly written so that it can be understood by any one, and instead of being shown complicated diagrams of the sexual organs readers are referred to standard works on anatomy or physiology if they feel that they need more detailed information than this book provides. This is considered a great recommendation, because

many of the far-too-numerous books on sexual matters that to-day flood the popular medical press contain figures which are not necessary and which (in spite of the statements by their authors who maintain that 'to the pure all things are pure') are calculated to encourage an increased circulation because they excite the ribaldry that is consciously or subconsciously present in a large proportion of the human race.

The book under review although it deals frankly with sexual matters is remarkably free from any suggestion of *double entendre* and is recommended to all women who, as their years advance, are anxious to maintain a pleasing exterior to a healthy body.

DENTAL PROSTHETICS. (OUTLINE OF DENTAL SCIENCE). Volume IV.—By J. D. Logan, L.D.S., F.R.C.S. (Edin.), and W. R. Logan, L.D.S. (Edin.), H.D.D. (Edin.), L.R.C.P. & S. (Edin.). Second Edition. 1934. E. and S. Livingstone, Edinburgh. Pp. xii plus 212. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 6-6

This work which was first published in 1926 has proved so popular that a second edition has been produced. The latest advances in dental prosthetics have been outlined in this edition including recent researches on plaster of Paris and a new chapter on stainless steel has been added.

The book is easily read and the various processes in dental prosthetics are clearly outlined.

One feels inclined to join issue with the authors with regard to their observations regarding certain forms of technique which are almost universally accepted and with which they do not agree. In this respect the volume is definitely an outline of dental prosthetics as taught by them in the Edinburgh Dental School.

Apart from this the work can be recommended to students as an easily readable book which will be a great aid to them in the study of the subject.

H. A. T.

Abstracts from Reports

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1932

VOLUME I

SECTION II

HISTORY OF CHIEF DISEASES

Chief causes of mortality.—In the report for 1930, it was stated that 'owing to the want of knowledge on the part of those responsible for registration, a number of diseases in which fever is a marked symptom are grouped under the general heading "fevers", whilst the "other causes" group defies any attempt at analysis, although in various limited areas certain efforts have been made which throw a modicum of light on the mysteries concealed by this omnibus term'. This position still holds good; the only diseases for which registration can be said to have reached a fair standard of accuracy are cholera, smallpox and plague, these being the most common and most fatal of the epidemic diseases which periodically devastate India. The urban death rates for smallpox, dysentery and diarrhoea and respiratory diseases were higher than those of rural areas, whilst those for cholera and 'fevers' were lower.

Cholera.—During 1932, recorded deaths from cholera numbered 67,219. The first impression one receives is that this figure is of catastrophic magnitude, nevertheless it is the lowest recorded in India since registration of deaths was introduced and gives a death rate of only 0.2 per mille. The only other comparable

annual figure is that for 1923 when cholera deaths numbered 73,002. As compared with the previous two years, every province showed a large decrease in incidence, although high mortality figures were still registered in the provinces of the United Provinces, Bihar and Orissa, Bengal and Assam. Bengal, the endemic home of the disease, suffered most severely, deaths numbering 33,910, or nearly 50 per cent of the total and the death rate being 0.7 per mille. Assam had a death rate of 0.6, and nearly 10,000 deaths were recorded in each of the provinces of the United Provinces and Bihar and Orissa. In the North West Frontier Province, in the Punjab, in Delhi and in the Central Provinces only mild outbreaks occurred whilst Coorg and Ajmer-Merwara were entirely free. Compared with 1931, only Burma and the Punjab recorded increased death rates and even there the increases were almost negligible.

Plague.—Examination of the figures for plague, over the period of years during which that disease has worked havoc in India, shows that the mortality in 1930 was the lowest on record, total deaths numbering 24,840 with a death rate of 0.1 per mille. This reduction was for the most part due to the fact that in nearly every instance the well-known endemic foci recorded large decreases.

During 1931, an upward trend in the mortality curve was recorded, total deaths numbering 45,626 and the death rate being 0.2 per mille. A further but minor increase occurred in 1932, when deaths totalled 46,504, but the reported cases for the first six months of 1933 indicate that the upward trend of 1931 and 1932 has been checked and that the 1933 total will be well below that for 1932 particularly in the most important foci of infection in Northern India which include the United Provinces and Bihar and Orissa.

Smallpox.—It is an unfortunate fact that India is still the chief endemic focus of smallpox in the whole world. Variola major continues to be the predominant type of the disease and, in consequence, the case mortality runs high although the recorded death rate for the population as a whole is as low as 0.2 per mille.

India seems to have been familiar for many centuries past, both with smallpox and with attempts at its prevention. A short quotation from Dr. Goodall's recently published volume is pertinent in this connection. He writes:—

'At the present day it is recognized that the most efficacious defence against both the epidemic and endemic prevalence of an infectious disease is the immunization of the population against that disease. In the case of one disease, smallpox, the practice known as variolation is of considerable antiquity. Doctors Wong and Wu have shown that it was introduced into China during the eleventh century, and we know that at about the same time it was being recommended, if not actually practised, in Europe. Doctors Wong and Wu are of the opinion that, like smallpox, variolation was introduced into China from India. When it was first practised in the latter country is not known, but tradition refers it to pre-Christian times. It is very probable that India was the primeval home of smallpox and that the disease and its prevention gradually spread eastward and westward from that country'.

Fevers.—A total of 3,456,144 deaths were ascribed to this cause, against 3,956,100 in 1931 and 3,680,165 the decennial mean. Out of this total, 3,272,593 deaths were registered in rural and 183,546 in urban areas, as against 3,761,465 and 194,635 in 1931; and 1,811,648 were males and 1,644,496 females. The death rate was 1.29 per mille as compared with 1.49 the rate both for 1931 and the decennial mean. Ajmer-Merwara again recorded the highest rate of 19 per mille; other high figures were Coorg 18, United Provinces 17, Punjab 16, North West Frontier Province 16, Central Provinces 15, Bihar and Orissa 15 and Bengal 14

Burma 6.2 and Madras Presidency 6.3 as usual returned much the lowest rates.

Malaria.—Nearly 11 million diagnosed cases of malaria were treated in hospitals and dispensaries as compared with about 11½ millions in 1931 and every province with the exception of the North West Frontier Province, Delhi, Bengal and Assam recorded decreases.

Quinine.—At the close of 1932-33 the total Government of India stock of quinine sulphate purchased as such and extracted from Java and Burma barks amounted to 282,759 pounds as against 290,149 pounds in 1931-32. Of this total, 62,634 pounds were at the Indian Museum, 215,513 pounds at Mungpoo and 4,612 pounds at Naduvattam. The total stock of cinchona febrifuge amounted to 22,965 pounds as against 29,953 pounds in 1931-32, including 12,390 pounds at Mungpoo, 10,462 pounds at Naduvattam and 112 pounds at the Alipore Jail.

Quinine from stock amounting to 11,369 pounds was distributed as follows: Punjab 7,768 pounds, United Provinces 1,887 pounds, North West Frontier Province 326 pounds, Central India 504 pounds, Delhi 236 pounds, Baluchistan 92 pounds and Sind 4 pounds. Cinchona febrifuge sold by the Bengal Government on Government of India account amounted to 8,968 pounds.

Dysentery and diarrhoea.—The incidence of these diseases was less than in 1931 and except in the North-West Frontier Province and Ajmer-Merwara, lower mortality rates were recorded throughout British India, the general rate being 0.8 per mille. Of the total, 115,979 deaths were males and 106,825 females; and 176,195 deaths were recorded in rural and 46,609 in urban areas. As usual, the third quarter recorded the highest number of deaths.

Enteric fever.—This disease is no doubt much more prevalent than the statistical records indicate, as most cases are recorded under 'fever'. It is very probable that in large towns like Delhi severe epidemics are of frequent occurrence and as a result a considerable portion of the child population acquires immunity. It is difficult to envisage any rapid improvement in the diagnosis of this disease in rural areas.

Respiratory diseases.—The total number of deaths in British India ascribed to this cause is 405,924 against 420,294 in the previous year.

Tuberculosis.—In previous reports various comments have been made as to the prevalence of tuberculosis in India, but no accurate estimate of its incidence is possible. Assuming that 2 per cent of the total deaths are due to tuberculous disease then nearly 150,000 persons die annually from this infection. But some experts hold that 10 per cent is nearer the truth, and, on that basis, tuberculosis deaths would number 650,000. The latter is almost certainly an exaggerated figure, but it is probable that the actual number of deaths lies somewhere between these two extremes and, even taking the lesser figure, the situation is serious enough.

Evidence clearly demonstrates the higher incidence among women of infection with the tubercle bacillus and the causes for that higher figure are not far to seek. Early marriage, the strain of a rapid succession of pregnancies and periods of lactation and the *pardah* system, with the inherent deprivation of fresh air and exercise which that social system involves, are all factors bound to produce among the younger women of this country a great lowering of resistance to disease which leaves them readily susceptible to acute infections such as tuberculosis. It is not surprising to find that the female mortality rates are much higher than the corresponding male rates in the age groups between 15 and 40 years. Here again recorded figures leave no shadow of doubt. In Bombay city, for example, out of a total of 1,232 deaths from tuberculosis, 761, including 381 males and 380 females, occurred in the age groups 20 to 40 years. During 1931 in Calcutta, three female deaths for every male death were recorded in the age group 10 to 15 years;

two female deaths to one male in the group 15 to 20 years; and 3 females to every male in the group 20 to 30 years.

The only organization solely concerned with anti-tuberculosis work in India is the King George's Thanksgiving (anti-Tuberculosis) Fund. This organization is ill-equipped financially and is mainly concerned with propaganda work. It may as yet be said to have only engaged in preliminary skirmishes with its subtle enemy and it is difficult to see how it can do more until ample funds are provided in every province. But it must be realized that the way to victory does not lie, except in small part, in the provision of clinics, hospitals and sanatoria. Money spent on such institutions will be money largely wasted unless the social factors involved are studied and then attacked with vigour. In the practice of more hygienic methods of living, in the provision of ample and nutritious food supplies and generally in a wider appreciation of the dangers inherent in harmful social practices will be found the way to a gradual decrease of this scourge of civilization and generally to a healthier and happier people.

Ankylostomiasis.—Much the highest number of patients was recorded in Madras Presidency, but this was probably in large part due to the active rural sanitation campaign which was being carried out in that province.

Leprosy.—The total number of cases treated in hospital was 81,083 but warning must once more be given that these numbers give little indication of either the actual or the relative incidence of leprosy in the different provinces.

Rabies and hydrophobia.—The total deaths from this cause were 2,453, only four less than in 1931.

Kala-azar.—The total number of cases treated in hospitals and dispensaries is 105,840, an increase of over 4,500 in the number treated in 1931.

Filariasis.—Under the auspices of the Indian Research Fund Association an investigation into the distribution of filarial infection has been carried out in recent years in Bihar and Orissa. The disease has been found to be prevalent, as 14 per cent of the general population have shown the microfilaria in their blood. The incidence of *F. bancrofti* was found to be the highest in the sea-coast belt, less high in the Gangetic plain and lowest in the submontane arable areas.

Yaws.—*Assam.*—This disease has been found to be widely distributed in the submontane region of the Kamrup district and in the district of Goalpara, Nowgong, Garo Hills, Sylhet, Khasi and Jaintia Hills and the Lushai Hills. Treatment was provided in the districts of Nowgong and Goalpara.

Burma.—In the Mergui district the special survey staff treated 235 cases between April and May and 114 cases in December 1932 and January 1933. As yaws is believed to be very prevalent in the upper reaches of the Tenasserim river, the Mergui district council and the district authorities in Tavoy agreed to extend survey and treatment work to those areas. In Mandalay district, cases were found in the villages of Singu township and arrangements were being made to provide for their treatment. In Lower Chindwin district, it was said to be prevalent in Kani township and sporadic in Yinmabin township. In the Chin Hills, 83 cases were treated in hospitals.

SECTION III

MATERNITY AND CHILD WELFARE

(a) *Maternity work and midwives' training.*—Various attempts recently made to ascertain more accurately the exact cause of maternal deaths have shown that mortality in connection with childbirth is very high and that the problem of maternal deaths is even greater than had been supposed. The lower rate reported for rural areas is probably due to faulty registration, because the facilities for skilled attendance must obviously be lower in the average village even although the general standard of health may be

higher. As in the case of infant mortality, the general causes of this high rate are known, although further investigations in particular localities are required, e.g., into the prevalence of anæmia of pregnancy and its influence on maternal mortality and the occurrence of diseases such as osteomalacia and eclampsia which complicate labour in certain parts of India. Apart, however, from such definite entities, which might be susceptible of rapid improvement, the main causes of maternal mortality lie in social customs which cannot be quickly influenced. Any reform, which has as its *modus operandi* an educational process, is bound to operate only gradually, and this fact should be recognized by hygienists and social reformers alike. This should not be taken as implying that we must be content to allow the reform to proceed at its own rate. It can undoubtedly be hastened and, in particular, by the provision of safe attendance at child birth. That means trained midwives and *dais* in far greater numbers than are at present available. Progress in this matter is exceedingly slow and it is even doubtful if it is keeping pace with the increase of the population. On the other hand, there is undoubtedly a greater appreciation of clean midwifery on the part of the general public. It would be a tragedy if this appreciation were not met by increased facilities in the shape of competent midwives. The training of illiterate women is a tedious business, yet the numbers of even partially educated women who are ready to become midwives is still very small, and the ancient prejudice against work which is regarded as 'unclean' still lingers. On the one hand, those who are trained tend to demand a wage which their education does not justify and, on the other, the family is unwilling to increase its expenditure even when a mother's life hangs in the balance.

Ante-natal work which is such a powerful factor in reducing maternal mortality is certainly on the increase. A greater number of women's hospitals are taking up this work and health visitors are playing their part. The attendance at ante-natal clinics is better than formerly and the public is beginning to understand the need for careful examinations. This is one cheering aspect in a situation which is otherwise far from reassuring.

Child welfare work.—In last year's review, references were made to the reports of the League of Nations' Committee on stillbirths and infant mortality and the hygiene of infants and children of pre-school age. No serious attempts have been made to estimate the causes of the high infant mortality rates in this country. Some of these are obvious and well known; others are obscure. The tendency of the rates to fall, though noticeable, is very small, just as is the case of the general death rate. The low general level of hygiene, the prevalence of preventable disease and the poor state of nutrition of the people all contribute to as high a death rate among children as among adults. A great lowering of the infant mortality rate cannot therefore be expected until the general death rate comes down. There are, however, causes affecting child life specifically which are capable of being attacked and which are as yet receiving very inadequate attention all over India. The amount of child welfare work undertaken is pitifully small and is showing little tendency to increase. Most local bodies are suffering from the economic depression which is affecting the whole world and, since preventive work among children is not regarded as a necessity, it is dispensed with as a luxury. The work of voluntary societies is also being hampered by shortage of funds. At such a time it is all the more necessary to scrutinize carefully all expenditure and it is more than doubtful if this is being done. Frequently a great lack of intelligence is shown in the spending of money and the result is that avoidable waste occurs. Local bodies are satisfied if they give small grants to societies which may have good intentions but are without knowledge. A well trained directing hand is

essential and at least one special officer should be at work under the director of public health in every large province. Unfortunately two out of the three Presidencies have still no such guiding hand, and the consequent lack of co-ordinated effort on behalf of the women and children in Bengal and Bombay is a blot on the public health administration of these provinces. No real advance can indeed be expected without such provision. Were it made, resources could be husbanded and used in constructive effort instead of, as at present is too often the case, wasted on unprofitable forms of charity. The expense of employing such workers is often given as an excuse, but if one province can spare the money, is it not possible for another to do so?

Such child welfare work as is going on at present is almost entirely confined to the towns. The rural areas present a field almost wholly untouched, yet life in the villages is on the whole more advantageous to children than urban life, so that health work has more chance of success there if it could only be initiated. One factor which makes for possibilities in this direction is the advance in road development. This brings the village into touch with larger centres and widens the villagers' horizon. It also renders possible the visits of medical women or health visitors to individual villages or groups of villages. No single village can hope to afford the services of a whole-time worker but one woman resident at a central point could influence a surrounding group of villages. In my opinion this should be the aim in the development of work in rural areas. With this could be combined the co-operation of a number of other agencies such as those alluded to in last year's report.

Depression in trade is also preventing the spread of child welfare work in industrial areas. It is, however, noticeable that business concerns and employers are beginning to realize the fact that care of the health of their employees and their families is an economic proposition. The position in the tea gardens of Assam, for example, is very different now to that in existence some years ago. The jute and cotton mills and the collieries have not as yet given much thought to this problem but there are signs that they too are waking up to the fact that better housing and greater amenities of life make for stable and contented labour. This is certainly the case in the Army where the increased attention paid to the health and welfare of women and children has led to success beyond all expectations.

Health work among women and children needs more and better forms of propaganda than are at present available. The material is poor and badly thought out, and many of the baby and health weeks are little more than 'tamashas'. This is all the more regrettable when one realizes that these could be made real stimulating and educative forces. Voluntary societies who are responsible for a great deal of this work would do well to pay more attention to this aspect of their activities.

A REPORT OF THE SIXTIETH YEAR'S WORK IN INDIA OF THE MISSION TO LEPERS. SEPTEMBER 1933 TO AUGUST 1934

This report concludes the sixtieth year of work of the Mission in India. It describes that the work began originally by those Dublin ladies, the Misses Pym, undertaking to collect between them £30 a year for the relief of lepers. In the first year they collected nearly £600. By the end of sixty years £1,899,372 had been raised, and the Mission is now at work in over twenty lands; and in India alone, still its main field of work, there are now 36 homes of the Mission with 6,700 inmates; 850 healthy children are being rescued by the special provision made for them; aid is given to another 15 homes with 1,600 inmates; 6,000 outpatients attend the Mission's clinics; and an uncounted host of citizens have been served by

the fact that every contagious case cared for has meant diminished risk of infection for them.

The general report is a record of devoted service given by many workers, and a continuous steady expansion of the organization throughout the sixty years of its existence. This is followed by detailed reports from all the homes in India. The Mission is a highly efficient and important organization which is worthy of all the support it can get from the public, for its funds are carefully expended and the greatest possible use made of the money available. The report ends with a brief review by Dr. Muir of the medical work which is fully abstracted below.

A review of the year's medical work.—In looking through the statistics for the last year of the work in India of the Mission to Lepers, we find that many of the figures remain about the same as in the previous year. But the number now under treatment has increased by 665, or over 10 per cent. Also the outpatients under treatment have increased by 1,722, or over 58 per cent; and those who have improved under treatment are 54 per cent more than last year. In fact the outpatients are rapidly increasing and will soon at the present rate exceed the inpatients under treatment.

The popularity of treatment is a striking feature of these leper homes. When it is remembered that several years are often necessary before recovery can take place, this is the more remarkable. Another remarkable thing is that almost all this increasing inpatient and outpatient treatment has been done by practically the same medical and nursing staff as was previously employed, though doubtless much extra help is given by educated and trained patients. At the back of all this increased work are two things: sympathy and enthusiasm; and it is these that make the medical work of the Mission so popular and such a success.

I referred last year to the importance of children, and the splendid work that the Mission does in its many homes for the children of leprous parents. During the past year, the children problem has been emphasized more and more by workers all over the world. It has been shown that the age factor is one of the most vital in the spread of the disease. In early years resistance to leprosy is much lower than in adult life. Thus the infection enters and spreads through the bodies of young children, many of whom become the infectious cases of the next generation; whereas those infected after puberty become chiefly non-infectious cases. If all children under ten years of age could be effectively isolated from infectious cases of leprosy, the disease would, in all probability, become a negligible one within two generations; but that is a very large IF. The Mission to Lepers has so far led the way in 'Save the children' policy; and will, I believe, realizing the all-importance of this side of the problem, develop more and more their splendid children's homes.

Apart from the work which the Mission itself is doing, it is inciting others who share its spirit to undertake anti-leprosy work. As an example may be mentioned an ex-patient who is running three leprosy clinics in a highly endemic area, where no fewer than 125 patients are cared for every week.

Correspondence

SOME OBSERVATIONS ON DYSENTERY AND DIARRHŒA AT DARJEELING

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—At Darjeeling there is a considerable increase in the incidence of dysentery and diarrhœa during the rains, but there is no indication of any epidemic.

The ideal hypnotic should have a wide margin of safety, so that there is little likelihood of dangerous overdosage even if the advocated dose is exceeded; it should of course have no serious adverse effect on the important organs of the body, such as the heart, that is to say, it should be entirely non-toxic in its ordinary effective dosage; further, it should produce no unpleasant effects, either at the time it is given or afterwards when its hypnotic effects wear off; and, finally, it should act rapidly.

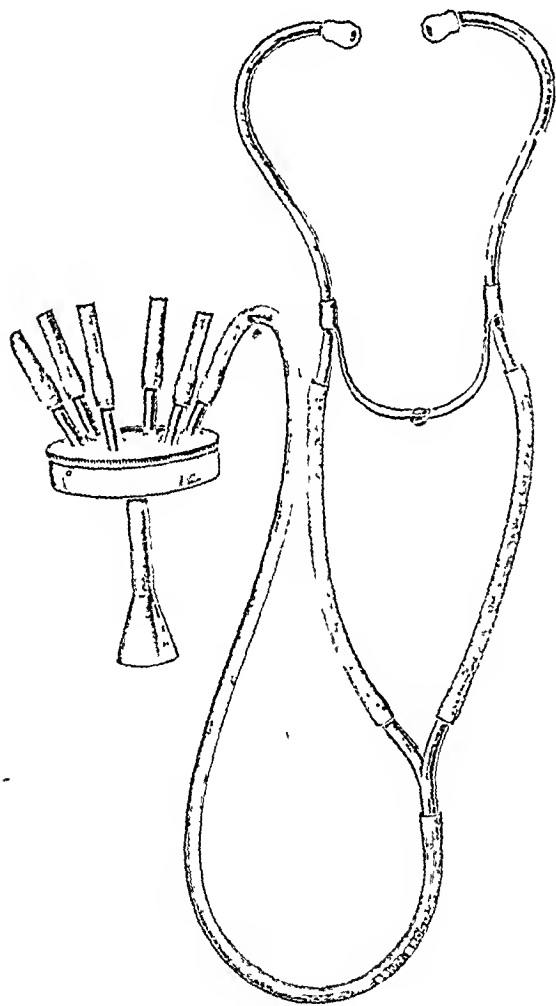
Ortal is said to possess all these qualities.

It is indicated in insomnia, nervous excitement, migraine, acute alcoholism, and as a premedicant when a general anaesthetic is to be given. It is not, however, an analgesic and therefore if an analgesic as well as an anaesthetic effect is desired, some such substance as aspirin should be administered with it.

A TEACHING STETHOSCOPE

By WILLIAM EVANS, M.D.

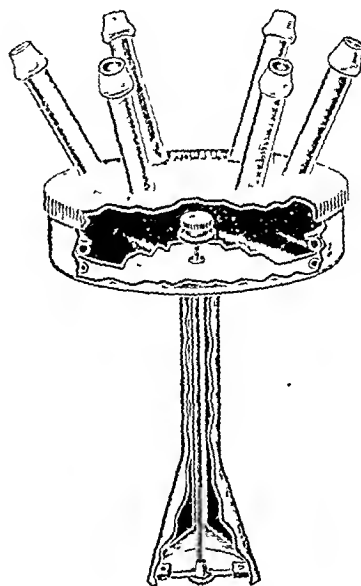
THE stethoscope illustrated here consists of a scientifically constructed sound chamber which incorporates a diaphragm and tension wire designed to transmit heart sounds which are mostly within the bass range of piano notes. Although the intensity of the sounds is diminished to some extent, the quality is preserved



and is comparable to that which a student hears when using his own binaural stethoscope.

Six observers (the instructor and five students) may auscultate the chest at the same time, and in this way the teacher is able to emphasize certain characteristics as they occur. It thus aids the instruction of students in the first principles of auscultation applied to both normal and adventitious heart and breath sounds, and

it provides the means of knowing that the student has heard the particular abnormality to which his attention has been drawn by his teacher. The stethoscope also enables every student among a moderately



large class to elicit a particular auscultatory sign in an ill patient without causing discomfort involved by repeated individual examination.

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Original Articles

THE INCIDENCE OF PNEUMOCOCCAL TYPES IN PNEUMONIA IN ASSAM

By L. EVERARD NAPIER, M.R.C.S., L.R.C.P.

and

DHARMENDRA, M.B., B.S.

From the Calcutta School of Tropical Medicine

PNEUMONIA has been reported as an important cause of death amongst the labour forces employed on tea estates in Assam. It was thought that, before undertaking any extensive enquiry into the incidence and cause of this disease, it would be as well to carry out a preliminary investigation into the bacteriology of the disease as it occurs in Assam, in order to find out if the infection were mainly pneumococcal, and if so what were the serological types of pneumococci mainly responsible.

Previous work on pneumococcal types

A considerable amount of work has been done on this subject during the last 25 years and figures showing the prevailing types in a number of places in Europe, America and Africa have been obtained. It will not be profitable to review these at any great length here, but two series are given for purposes of comparison:—

He did not make high-titre sera for any of his group IV strains, but used the serum of nine patients taken within one or two days of the crisis and put these up against 32 of his group IV strains. Two of his samples of serum each agglutinated the same six strains; the remainder agglutinated only the homologous strain. This suggests that there was a common local strain, which was not type I, II, or III.

Cunningham, Cruickshank and Ramakrishnan (1925) isolated 40 strains from cases of pneumonia in Madras; of these 29 were bile-soluble and were found to belong to the types as shown below:—

	Number	Percentages
Type I ..	18	62.06
" II ..	3	10.7
" III ..	2	7.2
Group IV ..	6	21.4

The striking point about these workers' observations is the small number of strains of group IV, compared with Malone's and our findings (*v. i.*). Few details are given of the bacteriological methods of identification, but bile-solubility appears to have been taken as the final criterion for differentiating *Streptococcus pneumoniae* from other streptococci. We do not think that this criterion is now accepted as absolute, and, though we have used the bile-solubility test in every case, we have classed four non-soluble strains as *Str. pneumoniae*, as they exhibited the diplococcal form in the mouse's heart's blood; of these four strains one

TABLE I

	CECIL AND PLUMMER (1933) NEW YORK		GLYNN AND DIGBY (1923)		
	LOBAR PNEUMONIA		LOBAR PNEUMONIA		BRONCHO-PNEUMONIA
	Number	Percentages	Number	Percentages	Number
Type I ..	1,384	32.1	47	44.8	1
" II ..	991	23.0	22	20.9	4
" IIA ..	..	..	1	0.9	1
" III ..	477	11.1	2	1.9	..
Group IV ..	1,458	33.8	33	31.5	16
Number in series	4,310		105		22

It is a subject that has not been taken up to any great extent in India, but Malone (1924) typed 106 strains of pneumococci isolated from cases of pneumonia occurring in Waziristan and Baluchistan. The incidence of the different types was as follows:—

	Number	Percentages
Type I ..	30	28.3
" II ..	18	17
" III ..	8	7.5
Group IV ..	50	47.2

was found to agglutinate with our serum A and one with our serum B.

It seems possible that some at least of these 11 strains should have been included in group IV. Had they all been included in group IV, the percentage incidence in this group would have been brought up to 42.5 which is much more in keeping with Malone's and our findings.

Previous work on pneumococcal types by one of the writers.—One of us (D.) working with Lieutenant-Colonel H. W. Acton typed 55

strains obtained from pneumonia cases in Calcutta; the results were as follows:—

	Broncho	Lobar	Total	Percentages
Type I	.. 4	7	11	20.00
" II	.. 1	2	3	5.45
" III	.. ..	3	3	5.45
Group IV	.. 19	19	38	69.09
	24	31	55	

The incidence of group IV in this series is much higher than in either of the other Indian series, themselves higher than the British or American series, but the Calcutta series were mixed cases, both lobar and broncho-pneumonia. However, if the broncho-pneumonia cases are excluded the incidence of group IV is still over 60 per cent.

The group IV strains of this series were further differentiated by testing them with type sera supplied by Dr. Georgia Cooper from New York; the results were as follows:—

	Broncho	Lobar	Total
Type 4	.. 1	..	1
" 5	.. 1	..	1
" 6	.. 4	4	8
" 11	.. 1	..	1
" 13	.. 3	..	3
" 14	.. 2	..	2
Ungrouped	.. 7	15	22
	19	19	38

The present investigation

In order to investigate the pneumococcal types in Assam a laboratory was established at Cinnamara, near Jorehaut; the reasons for the choice of this locality were that it was centrally situated with a large number of gardens within easy reach, and that suitable rooms for a laboratory and for animal accommodation were available. The locality exhibits no special features, that is to say it is a fairly typical example of the tea districts in the plains of Assam.

The medical officers in the neighbourhood were notified and asked to send in specimens of sputum from pneumonia cases. They were supplied with sterilized sputum bottles; details regarding the methods of collecting sputa were sent out with the sputum bottles; and it was requested that the specimens should only be collected personally by the assistant medical officers. Most of the specimens received were satisfactory, but a number were discarded as containing saliva only.

The method of procedure was as follows:—

On receipt of the specimen it was poured into a sterile Petri dish and a suitable sample of purulent exudate picked up with a platinum needle and inoculated on to a blood-agar plate and at the same time smears were made on three slides, which were subsequently stained

by Gram's method, by the Ziehl-Neelsen, and by Hiss's method for staining the capsule, respectively.

Another sample was tested by Armstrong's (1932) method on a slide against the 'fixed' types I, II and III.

With an emulsion from the sputum the precipitin test, suggested by Oliver (1920), was also carried out against the three 'fixed'-type sera.

Finally, a mouse was injected intraperitoneally with an emulsion from the sputum.

Results obtained with the direct typing methods

Armstrong's method consists in mixing a sample of sputum with about four times its volume of each type of the three 'fixed'-type sera, and examining the mixture under the microscope immediately; a positive result is indicated by a marked swelling of the capsule of the diplococcus so that in some instances it reaches almost the size of a red cell, whereas with the other sera no change takes place. This was done in 45 instances and three positive results were obtained; in each of these, confirmation of the correctness of the result was obtained by the mouse-inoculation method described below. No false positives were obtained, but in three instances negative results were obtained by Armstrong's method with sputa from which pneumococci of one of these three 'fixed' types were isolated.

Oliver's method was used in 14 instances, but no positive results were obtained, and later it was given up altogether.

Mouse-inoculation method.—On the morning following the inoculation, if the mouse was not dead, it was killed and a culture taken from its heart's blood on to blood agar and into broth. A smear was also made directly from the heart's blood and this was stained and examined. The blood-agar plates and the broth tubes were incubated at 37°C. for 24 hours. If both the blood-agar plate and the broth tubes showed a pure culture of pneumococcus, one broth tube was put aside for the bile-solubility and sugar tests, and the others were used for the agglutination tests; the contents were transferred to a sterile centrifuge tube and centrifuged; the supernatant fluid was rejected and the deposit suspended in normal saline; the saline suspension was used for the agglutination tests with the three 'fixed'-type high-titre sera and the 28 sera (classed as group IV) obtained from Dr. G. Cooper (we had no serum for type 26). Both the microscopic and the macroscopic methods of agglutination were used. For the former a thick emulsion of pneumococci (about 2,000 million per c.cm.) was mixed with a one-in-ten dilution of the 31 different sera and the slide examined after about half an hour in the 37°C. incubator; and for the latter an emulsion containing about

1,000 million organisms to the c.cm. was mixed with equal parts of a 1-in-5 dilution of each serum, placed in a water-bath at 55°C., examined after 2 hours, and then again after 20 hours.

The immediate test with peritoneal washings

Although the agglutination with the culture made from the hearts' blood of the mice was used as the final criterion for diagnosing the type, the immediate method of testing with the peritoneal exudate was also carried out in most instances.

The peritoneal cavity was washed out with about 2 c.cm. of normal saline, and if there was little cellular exudate an agglutination test was carried out with types I, II and III sera, and usually about 9 or 10 of the other type sera, as circumstances allowed. If there was much cellular exudate the agglutination test was not done, but the fluid was centrifuged and the supernatant fluid used for a precipitin test against the type sera.

Results.—The agglutination test was done on 26 occasions; it was positive in six and doubtful in two; in all eight cases the organism was proved by the confirmatory tests to be of the type indicated. In the other 18 cases, the organisms did not belong to any of the strains against which it had been tested.

The precipitin test was done on 23 occasions; it was positive in three cases and 'doubtful' in two; in all five the organism was shown to be of the type indicated. In the 18 remaining cases the test was negative, but in only one of these was the organism found to belong to a type against which it had been tested; it was tested by the precipitin test against types I to III and 4 to 12 with negative results and was eventually shown to belong to type 11.

Thus, taking two immediate testing methods together, we see that out of 14 occasions on which a positive result should have been obtained, there were 9 positive results, 4 doubtful and one negative. There were no false positive results, nor was there even a doubtful result in a case in which a negative one should have been given.

Results

Sixty strains were identified as *Str. pneumoniae*; the remaining five strains were hæmolytic streptococci, on which no further work was done.

The final results of the 'typing' of the 60 pneumococcal strains are shown in table II below.

It will be seen from this table that 8 were agglutinated by one or other of the three 'fixed'-type sera and 24 by the American types 4 to 32; this left 28 strains unidentified.

In order to classify these it was necessary to make high-titre sera; we decided to make sera from four strains in the first place.

TABLE II

Types	BRONCHO-PNEUMONIA		LOBAR PNEUMONIA		Total	Percentage incidence of group
	Cases	Deaths	Cases	Deaths		
I	2	..	4*	1	6	13.3
II	..	..	1	..	1
III	..	..	1	..	1
4	1	..	4	..	5	
6	..	..	1	..	1
7	1	..	1	40.0
8	1	..	2	..	3	
10	1	..	1	1	2	
11	..	..	1	1	1
13	1	..	..	..	1
14	..	..	2	..	2
16	..	..	1	..	1
17	..	..	1	..	1
18	..	..	1	1	1
20	1	1	..	..	1
21	1	1	36.6
22	..	..	1	..	1
25	..	..	2	..	2
A	2	..	6*	..	8	
B	4	..	10*	3	14	
Unidentified.	1	..	5	..	6	10.0
	15	1	45	7	60	

* The fate of one case of type I, of one case of type A and of three cases of type B was not recorded.

Preparation of high-titre serum.—Adult rabbits were used for this. The virulence of the strains was first raised by passage through a series of mice. The criterion for virulence was that one-millionth of a cubic centimetre of a broth culture would kill a mouse within 36 hours; 13, 12, 8 and 8 passages, respectively, were necessary in the case of the four strains.

An emulsion was made in saline from the centrifuged deposit from a broth culture inoculated 20 hours earlier from the heart's blood of a mouse. For the first three series of inoculations cultures killed by heating to 60°C. for half an hour were given, and then, after the resistance had been thus raised, live cultures were used. The injections were given intravenously into the ear of the rabbit. Eight courses of injections, each consisting of three injections on consecutive days, were given; an interval of from 5 to 7 days was allowed between each course, the whole procedure thus taking about ten weeks. The doses given were as shown below:—

Course	Amounts of broth in c.cm. from which deposit was obtained	Saline emulsion
1st	1, 2, and 3	Killed
2nd	5, 5, and 7.5	"
3rd	10, 15, and 15	"
4th	1, 2, and 3	Living
5th	5, 5, and 7.5	"
6th and 7th	10, 10, and 10	"
8th	15, 15, and 20	"

The blood was taken five days after the last injection in each case and the serum separated. A serum with a titre of 1 in 160 for the homologous strain was obtained. Cross-agglutination tests showed that these four sera represented two different types; these we have provisionally named A and B. Of the 28 unclassified strains 8 were agglutinated by our type A serum, and 14 by our type B. Cross-agglutination tests with the other types of pneumococci showed that serum A agglutinated type I cocci definitely but not completely in a dilution of 1 in 20, and types 7 and 20 partially in a dilution of 1 in 10 and 1 in 20, respectively, so it is apparent that there is some antigenic relationship between our type A coecus and these types, though type A coecus is not agglutinated by their high-titre sera.

There did not appear to be any relationship between our type B serum and any of the other types isolated.

Clinical types and death rate.—In a few cases we were able to confirm the clinical diagnosis ourselves, but in the majority we accepted the diagnosis of the medical officer in charge of the case, and in no case had we any reason to doubt the accuracy of the clinical diagnosis. Only 45 of the cases were lobar pneumonia; the remainder were broncho-pneumonia.

Amongst the broncho-pneumonia cases there was only one death in 15 cases, but amongst the lobar pneumonia cases there were 7 deaths out of 40 cases in which the clinical results were known (of the fate of 5 patients we had no information), that is to say, there was a death rate of 17.5 per cent, which in a series of which only 4 out of 45 were under twenty years of age is low, in view of the fact that none of the patients were treated with specific serum. There was one death amongst the three type I lobar pneumonia cases whose fate was known, no deaths amongst five type A cases, and three deaths amongst seven type B cases. The figures are too small to allow of any dogmatic conclusions, but they do suggest at least that the local type B is a comparatively virulent organism.

Many figures are available to show the relative virulence of the different types; we will quote three series, two from America and one from Great Britain.

Osler and McCrae (1925), Cecil and Plummer (1933), and Ferguson and Lovell (1928) give the mortality percentages with the different types, as shown below:—

	Osler and McCrae	Cecil and Plummer	Ferguson and Lovell
Type I	.. 24.1	28.2	26
" II	.. 37.7	48.9	20
" III	.. 53.7	42.7	*
Group IV	.. 22.2	31.3	26.4

* Insufficient figures available.

Pneumococci in normal throats

Pneumococci can be recovered from the upper respiratory passages in a large percentage of persons examined. Except however in the presence of an epidemic, or when the persons examined have been in close contact with a case or cases of pneumonia, the more virulent types are not usually found. There are many records of examinations of non-pneumonia cases reported in the literature; three examples are given here.

Thomson and Thomson (1932) found pneumococci in 67 out of 103 adenoids from children. Sailer, Hall, Wilson and McCoy (1919) collected 111 strains from 700 soldiers who had been more or less contacts in a pneumonia epidemic, and Avery *et al.* (1917) reported 121 strains from the throats of 297 normal persons; the distribution amongst the types is shown below:—

	Sailer <i>et al.</i>	Thomson Thomson	Avery <i>et al.</i>
Type I	.. 5.4	0	0.8
" II	.. 13.50	2	0
" IIA	.. ..	..	18.2
" III	.. 4.5	13	28.1
Group IV	.. 76.6	85	52.9
Number in series	.. 111	67	121

We collected only 12 strains from 25 normal throats; on the basis of the above classification they could all have been put into group IV, differentiating them further, however, we were able to place six of them into definite groups, as shown below:—

Type 4	..	..	.. 2
" 18	..	..	.. 1
" A	..	..	.. 1
" B	..	..	.. 2
Unidentified	..	..	.. 6

Discussion.—The first point that strikes one is that in the three Indian series, the Frontier series (Malone), the Calcutta series, and the Assam series, the incidence of pneumococci of group IV, as compared with the findings in England and America, is very high, and that it is highest in the present series. The distribution amongst the types in our series is, in fact, far more like the distribution that one finds in a series of strains collected from cases of broncho-pneumonia. The second point is that the reported death rate in our series is distinctly low; this is particularly striking as all the patients were tea-garden coolies treated in the garden hospitals where nursing, as it is understood in modern hospitals in Europe and America, and even in our large cities in India, is unknown. Though in a few instances mistakes in the clinical diagnosis may have been made, we cannot question the fact that the great majority of the cases diagnosed as lobar pneumonia had pneumonia of a definitely lobar type, but it is still possible that this pneumonia does differ from lobar pneumonia as it is encountered in England, in its pathology as well as in its bacteriology. (It was never possible to obtain post-mortem examinations in these cases.)

However, it is clear from our bacteriological findings that, whatever the clinical type of pneumonia, the fixed types I and II, which are the types used in the preparation of therapeutic serum, are comparatively rare, and that there is more than an eight-to-one chance against serum being of any value at all in the treatment of pneumonia in this district.

Regarding the two local types A and B, there are certain observations that appear to be contradictory; for example, these two types were found in 6 out of the 15 cases of broncho-pneumonia and 3 out of the 12 strains isolated from normal throats, but on the other hand of the 7 lobar pneumonia patients from whom type B was isolated and whose fate was known three died.

The other type (A) was responsible for no deaths at all, as far as we know, though it was isolated from 5 lobar pneumonia cases whose fate was known.

Further, our laboratory experiences suggest that the toxicity of type B is definitely higher than that of type A, for, whereas with the two strains of type A 13 and 12 passages respectively were required to raise their toxicity to the level where one-millionth of a cubic centimetre of broth culture kills a mouse in 36 hours, only 8 passages were required in the case of the two strains belonging to type B.

We have an analogy in type III; in America this organism is frequently found as a harmless commensal in the throats of healthy persons, yet type III pneumonia appears to be a very fatal infection.

The evidence on the whole seems to be in favour of type B being a strain with virulent potentialities; there is also evidence that it is a widespread one in the locality.

Summary and conclusions

The sputa from 65 cases of pneumonia were investigated with reference to the species and type of streptococcus that predominated.

Direct typing, mouse inoculation and cultural methods were used.

Five strains were identified as hæmolytic streptococci and 60 strains as pneumococci. Of the 60 pneumococcal pneumonias 15 were broncho-pneumonia and 45 lobar.

Of these 60 strains, 8 belonged to the 'fixed' types, 24 to other American types, and 28 were not identifiable with any sera we had in our possession; by the preparation of high-titre sera, 22 of the unidentified group were shown to belong to one of two types; these we have provisionally called A and B.

Our type A was not associated with any mortality and appears not to be a virulent type. Type B was responsible for three deaths in 7 cases of lobar pneumonia whose fate was known; on the other hand 4 out of the 15 strains from

(Continued at foot of next column)

PRELIMINARY OBSERVATIONS ON A NEW SOLUBLE ATEBRIN COMPOUND

By JOHN R. BLAZE, M.D. (Lond.), M.R.C.P. (Lond.)
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and

A. T. W. SIMEONS, M.D. (Heidelberg)

The following is a preliminary report on 21 cases of malaria treated with atebirin musonate, an atebirin salt of musonic acid, which was placed at our disposal by the manufacturers (Bayer-Meister Lucius) for a clinical trial during the epidemic in Ceylon.

Atebrin musonate is a yellow powder, readily soluble in water; it is supplied in dry ampoules,

(Continued from previous column)

cases of broncho-pneumonia and 3 out of 12 strains from normal throats were type B.

It is evident that there is little 'fixed'-type pneumonia in this district and therefore commercial therapeutic serum is not likely to be of much use in treatment.

It is considered that type B is probably a strain with virulent potentialities that has a widespread distribution in the area in which we were working.

If further experience shows that our type B pneumococcus is common in other districts in Assam and in other years, the question of making serum against or vaccines from this organism should be considered.

Acknowledgments

Our thanks are due to Dr. D. Manson, medical officer of the Jorehaut Tea Company, for placing a laboratory at our disposal and for much assistance in connection with this enquiry; also, to Dr. D. Manson, Dr. G. Macdonald, and to other medical officers who kindly sent us sputum from their pneumonia cases. The high-titre sera used in this enquiry were kindly supplied to us by Dr. G. Cooper, Health Department, New York.

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each containing 0.125 gramme (corresponding to 0.1 gramme of atebirin dihydrochloride), which is to be dissolved in exactly 3 c.cm. of water, for intramuscular or intravenous injection. The dose suggested by the manufacturers is 1 to 3 ampoules for intramuscular, and 1 ampoule for intravenous administration.

Before going into the case-histories it may be worth while to consider a few theoretical points.* Hecht (1933) has shown that a large portion of atebirin taken by the mouth is retained in the upper intestine, liver and bile, and concluded from his observations that the atebirin circulates from the intestine to the liver, is excreted with the bile back into the duodenum from where it is again reabsorbed into the liver. It is believed to circulate in these organs in this way before reaching the peripheral blood in any large amount. If this is correct it is probable that upon continued administration a point is reached where the liver becomes saturated with atebirin, and the atebirin then 'overflows', so to speak, into the peripheral circulation, where it acts as a parasiteicide. This might explain the fact that atebirin given orally has no immediate effect upon the clinical picture. Parasites and fever remain uninfluenced during the first 3 days of oral atebirin treatment; while usually on the fourth day there is an abrupt change, in that the temperature drops to normal and remains there, the parasites suddenly decrease or disappear, and a considerable amount of atebirin, hitherto practically absent, appears in the urine (Tropp and Weise, 1933). This would indicate that only about the last 6 to 7 tablets of a 15-tablet course of atebirin are actually therapeutically utilized whereas the first 9 tablets are necessary to saturate the liver to such an extent that it will allow the subsequent doses to leak out into the general blood stream.

If these conjectures are anywhere near the truth an immediate effect might be expected from parenterally administered atebirin, both on the parasites and on the fever; the necessity of saturating the liver with the drug before it can act on the parasites should be avoided; and a therapeutic effect equivalent to that of 15 tablets by the mouth should be obtained with a far smaller quantity of atebirin given parenterally. R. Green (1934), studying the toxic effects of atebirin, has already discussed Hecht's theory of 'inner circulation' and hints at similar conclusions. He also finds that toxic effects, such as headache, yellow discoloration of the skin, and colicky pain in the upper abdomen, are seen in cases where the appearance of atebirin in the urine, usually on the third or fourth day, is delayed. This can mean two things: either that toxic symptoms are caused by an exceptionally high concentration

in the upper intestine and liver, or that after a high concentration in these organs has been reached, toxic symptoms are caused by the liver suddenly spilling an unusually large quantity of atebirin into the peripheral circulation. We are inclined to believe that the first explanation can account for headache and colicky pain, while the second causes yellow discoloration of the skin. Our reasons for this belief are conclusions drawn from the present series. In none of our cases did we observe either colicky pain or headache; and a yellow discoloration was only (and that very markedly) noticed in 2 cases which had received an intravenous injection of atebirin musonate. It seems as if a sudden high concentration of atebirin in the peripheral blood causes the drug to be deposited in the skin. From the appearance of the urine it may be inferred that excretion begins within a few hours after intramuscular injection of atebirin musonate.

In the present series we are chiefly concerned with the clinical treatment of malaria. During an epidemic and in a congested hospital it becomes exceedingly difficult to follow up the cases; the question of relapses will therefore be reserved for a future publication. We have excluded from the present series cases suffering from other diseases in addition to malaria, of which a number were treated with the same results as far as the malaria was concerned.

*Case 1 (chart 1).—*An adult male, admitted with a history of 1 month's fever with chills, claimed to have had no previous treatment. Blood: B. T. +++ (30 to 40 parasites per field, thin film). One intramuscular injection of 3 ampoules (0.375 gramme) of atebirin musonate; no other treatment. The following day maximum temperature was 100°F. (4-hourly reading). Marked decrease in number of parasites; second and similar injection given. On the third day temperature normal, blood film and thick drop both negative; third and last injection given. The patient received no other treatment and has remained free from fever and parasites while under observation. In this and all subsequent cases the injection proved to be painless; no local irritation or reaction was seen in any cases of this series.

*Case 2.—*An adult male suffering from fever and chills for 3 days. Blood: fair number of M. T. rings. Three ampoules of atebirin musonate given in one injection. The temperature dropped to normal within 4 hours and remained so during the period of observation. On the second day the thick drop showed scanty rings; a second injection was given. On the third day an occasional ring was found in the thick drop, 3 atebirin tablets were given by the mouth, and repeated on the next 2 days. On the fourth day the blood was free from parasites, and remained so on every following examination. The patient was carefully questioned, and no untoward symptoms observed.

*Case 3.—*A heavy mixed infection with M. T. and B. T., the latter preponderating, in an adult male suffering from fever with rigors for the last 12 days. After the first injection, M. T. negative, B. T. ++. After the second injection (third day), M. T. negative, B. T. scanty, temperature normal; three days' oral atebirin after-treatment started. From the fourth day onwards the blood has remained free from parasites. No untoward symptoms.

*Case 4.—*An adult male, suffering from fever with rigors for 4 days; no previous treatment. Blood:

*Readers are referred to the editorial on p. 213 where these theoretical considerations are discussed.—
EDITOR, I. M. G.

Observations on Atebrin Musonate Blaze and Simeons

CHART 1.

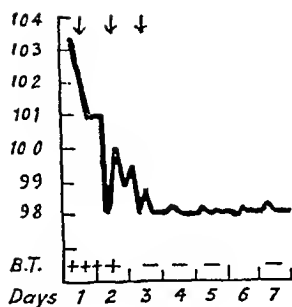


CHART 2.

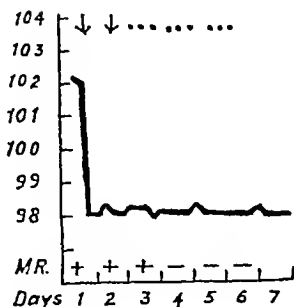


CHART 3.

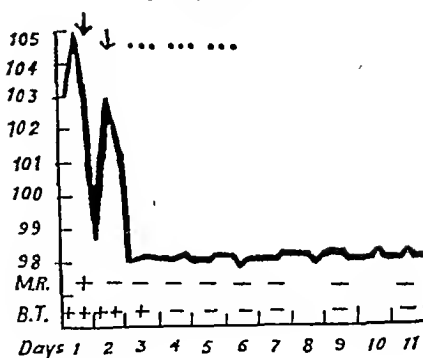


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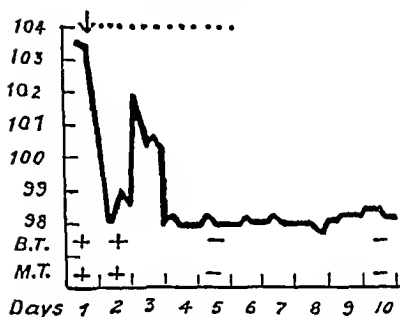


CHART 5.

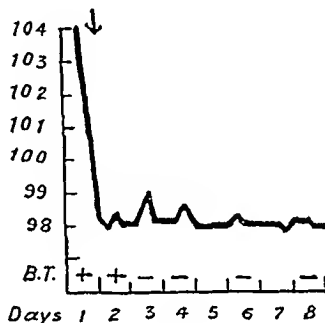


CHART 6.

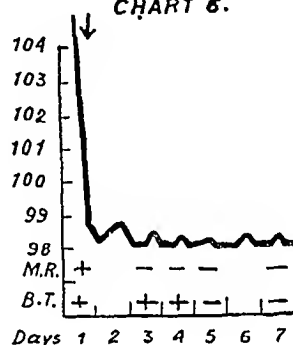


CHART 7.

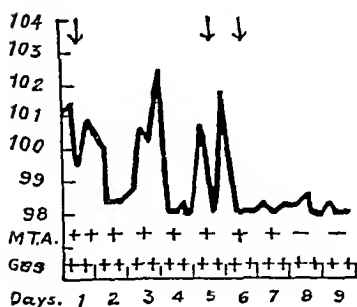


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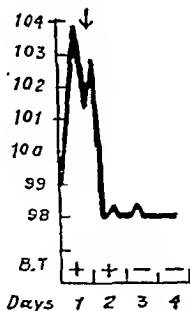


CHART 9.

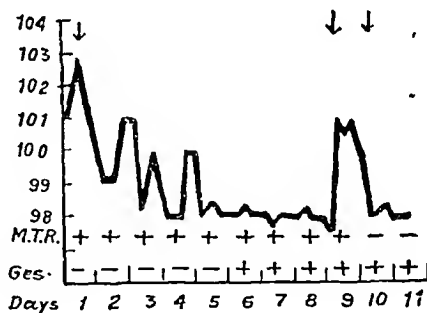


CHART 10.

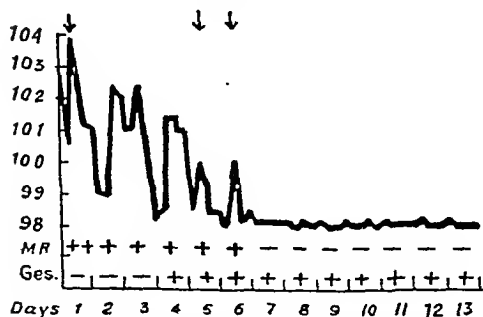
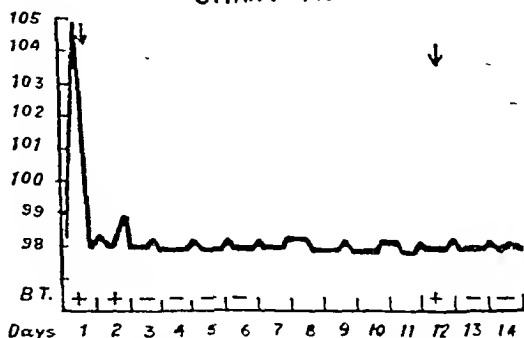


CHART 11.



Charts showing effect of atebrin musonate on the temperature and parasitic infection.
(The arrows indicate the injection of 0.375 grammes of atebrin musonate)

Observations on Atebrin Musonate Blaze and Simeons

CHART 12.

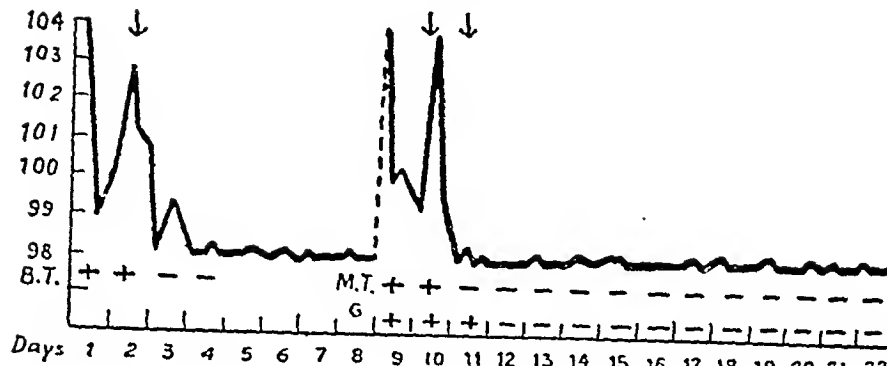


CHART 13.

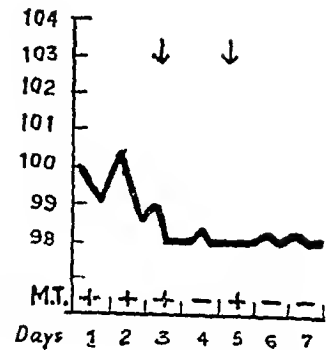


CHART 14.

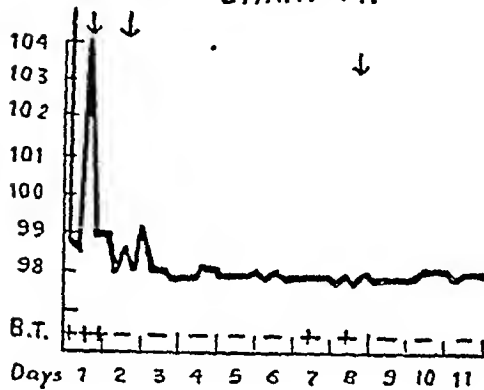


CHART 15.

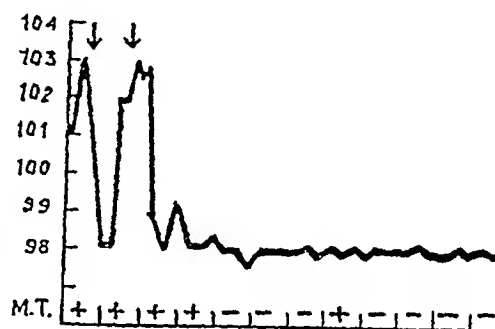


CHART 16.

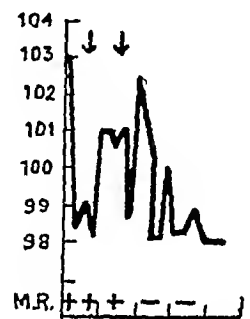


CHART 17.

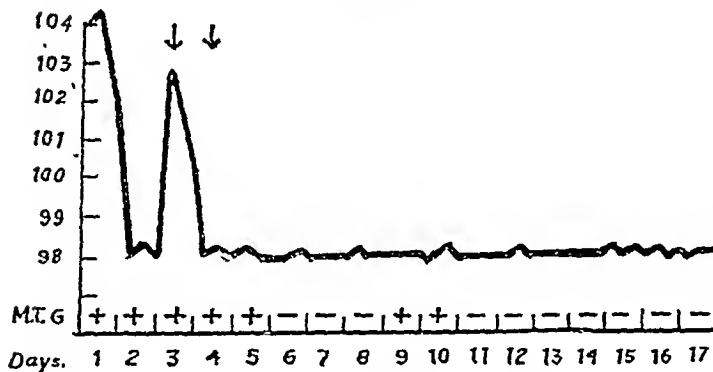


CHART 18.

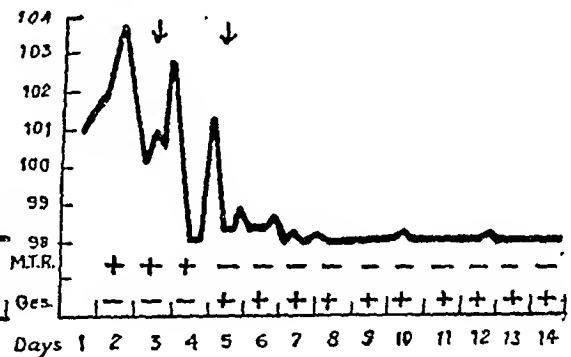


CHART 19.

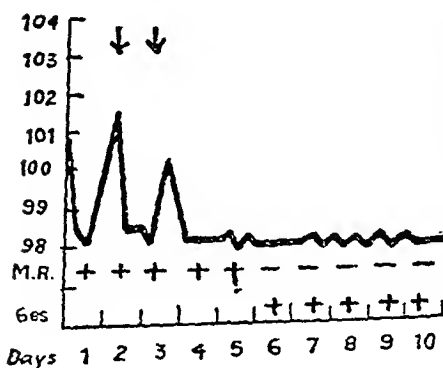


CHART 20.

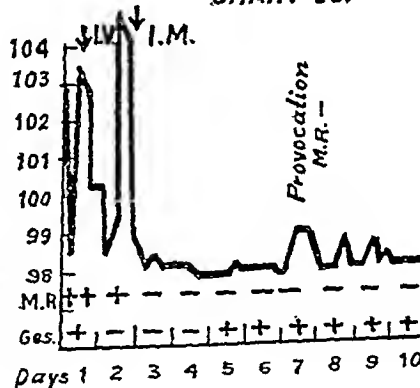
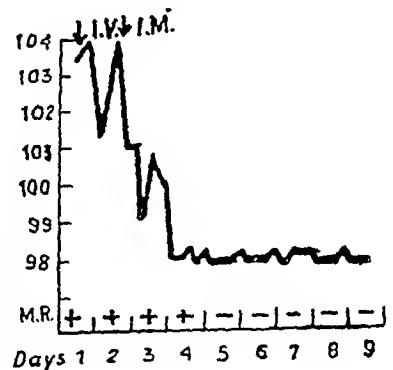


CHART 21.



Charts showing effect of atebrin musonate on the temperature and parasitic infection.
(The arrows indicate the injection of 0.375 gramme of atebrin musonate)

B. T. +, M. T. +. An injection of atebtrin musonate was given and followed by 4 days of oral atebtrin, 1 tablet thrice daily. Apart from the fact that the second rise in temperature remained comparatively low the chart shows no improvement on an ordinary oral atebtrin chart. The blood was not examined on the third and fourth days, but found to be negative on the fifth day, and has remained negative while under observation.

Case 5.—An adult male suffering from fever with rigors for 3 days. Blood: B. T. +. One injection was given without any after-treatment. The blood was free from parasites on the day after the injection and the temperature normal, and remaining so for the period of observation (seven days).

Case 6.—An adult male with a mixed M. T. and B. T. infection. One injection of atebtrin musonate given; no after-treatment. Temperature normal within 8 hours. M. T. rings negative, on the third day; B. T. persisting for 4 days. Temperature remained normal from the second day onwards.

Case 7.—An elderly male suffering for 3 days from fever. The blood showed a very heavy M. T. infection, rings ++, crescents ++. One injection was given which reduced the number of rings considerably, the crescents persisting. As both temperature and parasites persisted two further injections on the fifth and sixth days were given with an immediate effect on the temperature, the parasites disappearing on the eighth day (second day after last injection). The crescents remained uninfluenced throughout.

Case 8.—An adult male suffering for 8 days past from high fever with rigors. Blood: B. T. +. He was given one injection and the blood was found free from parasites 2 days later. The patient left the hospital on the fourth day feeling well. While the time of observation is too short to form an opinion regarding a recrudescence the case has been included as an example of the effect on the clinical picture sometimes seen after a single injection.

Case 9.—An elderly male suffering for one month from fever and chills. Blood: M. T. rings +. One injection brought the temperature gradually down to normal in 4 days. The rings persisted and on the sixth day crescents appeared for the first time. On the ninth day there was a recrudescence of the fever. An injection was given followed by another the next day. The temperature fell, and the rings disappeared for the first time. Crescents persisted throughout.

Case 10.—An adult male suffering from fever for the last 3 weeks and claiming to have had no previous treatment was found to be heavily infected with M. T. rings. One injection only reduced the number of parasites, while the fever persisted. Two other injections were therefore given on the fifth and sixth days. On the seventh day the temperature became normal and the blood free from rings, remaining so during the period of observation. Crescents appeared on the fourth day and persisted throughout.

Case 11.—An elderly male suffering from fever with chills for the last 4 weeks was admitted unconscious with a very bad pulse. B. T. parasites were found in the blood and an injection of atebtrin musonate given at the height of the fever. The temperature dropped within a few hours and remained normal, the parasites disappearing on the second day after injection. Parasites reappeared on the twelfth day, without any rise in temperature; after another injection the blood was again free.

Case 12.—An adult male suffering from fever and chills for 3 days. Blood: B. T. +. One injection caused parasites and fever to disappear in 24 hours. On the ninth day however the temperature rose with a rigor from normal to 104°F. and the blood was found to contain M. T. rings and crescents. Injections were given on the tenth and the eleventh days with an immediate effect on temperature and parasites. No crescents were detected after the eleventh day.

Case 13.—An adult male suffering from a mild M. T. infection was kept under observation without any treatment for 2 days and injected on the third. On the fourth day temperature was normal and parasites absent. On the fifth day a few rings reappeared and a second injection was given. Parasites remained absent on the two following days. The patient could not be induced to remain in hospital; but he has reported regularly for 18 days in all during which time the temperature has remained normal and the blood free from parasites.

Case 14.—A young male patient suffering from a heavy B. T. infection. Two injections were given at an interval of about 15 hours. On the day of the second injection the blood was free from parasites and the temperature almost normal. On the seventh day a few parasites reappeared in the blood. As they were still present on the eighth day, another injection was given, although there was no rise in temperature; during the 3 following days of observation the parasites remained absent.

Case 15.—An adult male suffering from an M. T. infection. Two injections were given at an interval of 24 hours. On the day after the second injection the temperature became and remained normal, the rings disappearing on the fifth day. On the eighth day a few rings were again seen. They however disappeared on the following day without any treatment and remained absent for the period of observation (16 days, 4 days longer than chart 15), the temperature remaining normal.

Case 16.—A heavy M. T. infection in an adult male was treated with 2 injections. Although the period of observation is too short to form an opinion regarding a recrudescence, the case has been included because it is the only one in which a high temperature was seen after the second injection.

Case 17.—An M. T. infection in an adult male. The patient was kept under observation for 2 days without any treatment and given an injection on the third and fourth days. The temperature dropped and remained normal after the first injection, the rings persisting for 1 day after the second injection. On the ninth and tenth days of observation a few rings reappeared without any febrile reaction and disappeared spontaneously, the blood remaining free up to the time when the patient was discharged, 7 days later.

Case 18.—An adult male suffering from an M. T. infection was observed without treatment for 2 days and given injections on the third and fifth days. On the sixth day maximum temperature was 99°F.; from then on normal. On the fifth day rings were absent, while crescents appeared, this remaining so during the period of observation.

Case 19.—A young male patient having a fair number of M. T. rings in his blood was kept under observation without any treatment for 1 day and received an injection on the second and third days. On the fourth day the temperature became and remained normal while from the sixth day onwards rings were absent and crescents present.

Case 20.—A young male suffering from a very heavy M. T. infection with rings and crescents, having received no previous treatment, was given an intravenous injection of 1 ampoule of atebtrin musonate (0.125 gramme). The injection was not followed by any untoward symptoms, but on the next day the temperature rose to 105°F. and a marked yellow discoloration of the skin was noticed. An intramuscular injection of 0.375 gramme of atebtrin musonate was given at the height of the fever. On the following day the temperature was normal and blood free from parasites. Crescents, not seen on the second, third and fourth days, reappeared and persisted from the fifth day onwards. On the seventh day there was a rise in temperature (99°F.), but the blood remained free from rings even after a provocative injection of adrenalin, and 2 days later the temperature returned to normal without any treatment.

Case 21.—A young male patient suffering from an M. T. infection was given an intravenous injection of 1 ampoule of atebirin musonate (0.125 gramme). On the next day the temperature was still 104°F., and a yellow discoloration of the skin was distinctly noticeable. An intramuscular injection of 3 ampoules was given. From the fourth day onwards temperature was normal, and from the fifth day parasites were absent from the blood.

Conclusions

The conclusions that can be drawn from this short series of cases are :

(1) The intramuscular injection of atebirin musonate in therapeutic doses does not give rise to toxic or unpleasant symptoms.

(2) While a single injection of 0.375 gramme of atebirin musonate has in some cases a remarkable effect on the clinical picture, a recrudescence usually occurs within a few days. Heavy malignant tertian infections are only slightly influenced.

(3) Two injections of 0.375 gramme given on successive days are sufficient to control within 48 hours the temperature, and in a maximum of 4 days all forms of benign tertian parasites, and the ring forms of malignant tertian. Crescents appear to be in no way influenced, and must be destroyed by plasmochin. In some cases there is a reappearance of parasites in the blood after a few days, but they disappear spontaneously. In no case hitherto observed has there been a return of fever after 2 injections. We are dealing with unusually heavy infections in a poor and mostly underfed class of patients.

(4) The intravenous route though harmless is not satisfactory for routine treatment.

(5) The theoretical considerations already set out are supported by the result obtained. Atebrin musonate is a drug worthy of further investigation.

(6) The immediate results of treatment with atebirin musonate appeared to be good enough to justify our making this preliminary report. But the period of observation has not been long enough to enable us to compare the relapse rate after atebirin musonate with that after oral atebirin or quinine. Observations upon this important question are being made.

Our thanks are due to the Director of Medical and Sanitary Services, Dr. Briercliffe, for permission to try this drug; and to the Medical Superintendent and the other members of the staff of the General Hospital, Colombo, for their help and co-operation during a time of quite unusual congestion and overwork due to the prevailing epidemic.

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HABITUAL USE OF BARBITURIC ACID DERIVATIVES IN INDIA

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Introduction.—During recent years a large number of barbituric acid derivatives have been introduced into therapeutics; the following are some of the important compounds known to the profession in this country :—

- (1) Barbitone, or veronal (di-ethyl-barbituric acid),
- (2) sodium barbitone, or medinal (sodium salt of barbitone),
- (3) propional (di-propyl-barbituric acid),
- (4) neonal, or soneryl (N. butyl-ethyl-barbituric acid),
- (5) dial (di-allyl-barbituric acid),
- (6) phenobarbitone, or luminal (di-phenyl-barbituric acid),
- (7) sodium luminal,
- (8) phanodorn (cyclo-hexenyl-ethyl-barbituric acid),
- (9) evipan (N. methyl-cyclo-hexenyl-methyl-barbituric acid),
- (10) sodium evipan,
- (11) pento-barbitone (ethyl-methyl-butyl-barbituric acid) and
- (12) its sodium salt, nembutal,
- (13) ipral (calcium ethyl iso-propyl-barbituric acid),
- (14) allonal (a combination of allyl-iso-propyl-barbituric acid with amidopyrin),
- (15) veramon (a combination of veronal with amidopyrin),
- (16) somnifaine (a combination of dial and amidopyrin),
- (17) cibalgin (a combination of dial and amidopyrin),
- (these last four all produce a reddish-brown colour in urine on account of the presence of amidopyrin),
- (18) gardenal (phenyl-ethyl-barbituric acid),
- (19) sodium hebaral (sodium salt of hexyl-barbituric acid),
- (20) beatol (a proprietary preparation said to be a mixture of veronal with extracts of valerian and jusquiame),
- (21) quadronox (a proprietary preparation said to contain 80 per cent veronal with phenacetin, phenazone, etc.; urine may be coloured reddish-brown from the phenazone present),
- (23) amytal (iso-amyl-ethyl-barbituric acid),
- (24) pernocton (2 butyl-brom-ethyl-barbituric acid),
- (the sodium salts of both these are used by the intravenous route to produce anaesthesia),
- (25) nastal (iso-propyl-brom-allyl-barbituric acid), and
- (26) sandoptal (iso-butyl-allyl-barbituric acid).

The addition of alkyl or aryl radicles of higher molecular weight than ethyl adds to the toxicity of the substance, thus luminal, dial, propional, gardenal, soneryl and nembutal are all more toxic than veronal. Launoy and Contiere, taking veronal as unity, have found that the relative toxicity for dial is 3.1, for soneryl 4.7, and for both amytal and nembutal 10.1. It is therefore safer to use for hypnotic purposes barbitone or its sodium salt than the more complex derivatives. Although these drugs as a rule are not very toxic and the average minimum fatal dose for barbitone (veronal) is 3 to 4 grammes (45 to 60 grains) deaths have occurred from much smaller doses, e.g., 1 gramme or 15 grains given in one dose. On account of their easy availability they have been used for suicidal purposes.

The combination of a barbituric acid compound with an analgesic drug, such as amidopyrin, phenacetin, etc., occurs in veramon, allonal, cibalgin, somnifaine and quadronox. Such combinations are likely to have more toxic effects on the organism and frequent repetition of therapeutic doses may produce serious effects.

Wagner (1933) has divided the barbituric acid compounds into two groups, (1) the shorter-acting drugs, which are eliminated rapidly and whose cumulative effects are not marked; to this category belong pento-barbital sodium, amytal and secondary butyl beta

brom-allyl-barbituric acid sodium salt, and (2) the longer-acting drugs, which are eliminated slowly, have marked cumulative effects and lead to delirious reaction or other toxic symptoms: to this category belong phenobarbital, neonal, ipral, a barbituric derivative with amidopyrin, dial and barbital. It may be generally said that combination with sodium makes the compounds more rapid in their action. The degree of toxicity of these compounds according to this author starting from the highest is as follows: secondary butyl beta brom-allyl-barbituric acid sodium salt, barbital, phenobarbital, amytal, neonal, a barbituric derivative with amidopyrin, dial and pentobarbital sodium.

Action and use.—The physiological effects of these compounds comprise not only a specific hypnotic action on the brain, but also on the lungs, heart and kidneys. The heart rate is quickened, vasodilatation is produced and the blood pressure falls partly owing to vasodilatation and partly to the toxic action of the drugs on the myocardium; the pulse may become intermittent. In severe cases death may occur from heart failure. In certain patients, such as those suffering from hyperthyroidism, exophthalmic goitre or severe toxæmia, sepsis, etc., the toxic effects of barbituric acid compounds are greatly enhanced so that even an ordinary therapeutic dose may produce dangerous symptoms or even fatal results.

They produce a slight fall in the body temperature; the basic metabolic rate is little affected; they have no appreciable effect on blood sugar; the calcium content of the blood is definitely decreased. All members of this series depress the respiratory system and produce physical signs of broncho-pneumonia. The urinary output is appreciably diminished but the flow returns to normal within about 24 hours; drugs like nembutal are said to produce suppression of urine. Some workers have found a slight but transient damage to the liver, others consider very little action on the hepatic function. The tone of the gastro-intestinal muscle is decreased. So far as the nervous system is concerned the threshold for painful stimuli is decidedly increased and during deep narcosis no response to painful stimuli can be obtained. The pain has been controlled in patients with tabetic crises. Large doses, or in susceptible individuals even small doses, may cause a drowsy condition accompanied by fever and rapid development of coma. The psychological effects of these compounds have been worked out; after administration of these drugs there is a striking change in the emotional attitude of the subjects and a definite feeling of euphoria is said to be obtained.

The barbituric acid derivatives are perhaps the most commonly used hypnotics at the present day. When taken by the mouth they are quickly absorbed and within an hour or so after a clinical dose sleep usually ensues. After a single therapeutic dose a period of sleep lasting from six to twelve hours usually occurs,

without unpleasant after-effects. There is more certainty of action than with most of the other hypnotics, with the exception of opiates, and this is the reason for the popularity of this group of hypnotics. Many of the drugs mentioned have been used for basal anaesthesia, those which are most commonly used at the present time being nembutal, pernocton, amytal and evipan. On account of their effective sedative properties, they are used in the treatment of hysteria, neurasthenia, chorea and epilepsy.

Toxic effects and habit formation.—In a paper in the *Lancet*, Sir James Purves-Stewart and Sir William Willcox (1934) have described a series of cases of poisoning by barbitone and allied drugs. Besides the toxic effects produced by massive doses of these compounds they also produce dangerous cumulative effects when repeated in therapeutic doses and there is a tendency to habit formation. These facts have not been sufficiently appreciated by the medical profession in India. During recent years the use of barbituric acid derivatives has considerably increased in India and a number of compounds, particularly luminal, veronal, medinal, veramon and adaline, are being largely used by medical practitioners. On account of their marked hypnotic and analgesic properties, less disagreeable taste and irritant effects, they are preferred to the chloral and sulphonal group of drugs. The lay public have also begun to use them, without medical advice, for the purposes of producing sleep or relieving pain, with the result that in quite a number of cases habit formation have occurred.

The question of habit formation with these drugs has been discussed by Gillespie (1934) and he has brought forward certain *a priori* considerations against the likelihood of the frequent occurrence of this.

While engaged in the study of drug habits in India we have been making enquiries regarding the use of these drugs by the public and have found that habit formation does sometimes follow the use of members of this group of drugs. Our enquiries show that addiction is still uncommon, but, as there are no restrictions to the sale of these drugs, there is likelihood of the extension of this practice. Instances of abuse of these drugs are at present confined to large towns only. We have been informed that certain members of this group are being employed by young licentious individuals and by prostitutes for their sexual effects, and it has been alleged that they have been employed for stupefying young girls for immoral purposes. We have, however, not been able to trace any case of this nature. The use of barbiturates is at present confined to the educated classes, probably because they have opportunities of reading notices in the medical and the lay press extolling the hypnotic and

analgesic properties and alleged freedom from toxic and harmful effects of these drugs, and thus they start self-medication.

The following cases which have come to our notice are typical examples of the abuse of these drugs :—

(1) S. L., a Hindu male, aged 22, an intelligent and healthy-looking young man, was working as a compounder with a medical practitioner in Gujranwala. In April 1928 he suffered from acute bronchitis and could not sleep for four nights. He prescribed himself two tablets ($7\frac{1}{2}$ grains each) of sodium barbitone which procured him good sleep. This dose was repeated every alternate night before going to bed, for a period of a fortnight, after which it was discontinued. Although his cough was alleviated, the patient could not sleep and again resorted to the drug. On being warned he stopped the drug for a few months but was so much troubled with insomnia and irritability of temper that he secretly continued the drug off and on for a period of 3 years, sometimes taking as much as 4 tablets (30 grains) in 24 hours. During this time the patient suffered from progressive anaemia and loss of weight, but carried on his work. In January 1932 he showed signs of exhaustion, inability to concentrate and was compelled to abandon his work. He suffered from palpitation, marked asthenia, unsteady gait, tremors of the hands and feet, and a sinking feeling in the chest. He looked very pale and anæmic; his total red cell count was 3,500,000 and hæmoglobin 75 per cent. The upper eye-lids were puffy and slightly swollen; the urine was scanty, high-coloured and showed traces of albumin; he had tachycardia, and hæmic murmurs were present. There was severe headache and slow cerebration. This condition lasted 3 months, the patient still continuing to take two tablets of this drug daily.

The patient now came under treatment, the drug was withdrawn without any difficulty and general measures, such as hot foot-baths, sponging, massage, etc., were adopted to combat insomnia. An alkaline mixture containing 10 grains each of bromides of ammonium and potassium with 10 minims of tincture of digitalis was prescribed. After a week's treatment little or no improvement was observed in the mental condition, although the general condition was better. Insomnia however was so troublesome that he secretly arranged to buy a phial of sodium barbitone. On the 20th January he took two tablets at 6-30 p.m. without getting sleep; at 8-30 p.m. two more were taken. Half an hour after the second dose he became dyspnoic and sleepy, and went to bed at 9-15 p.m. Coma supervened and the patient became cyanosed; the temperature rose to 103°F . and the pulse rate to 130 per minute; the breathing became stertorous and laboured; there were physical signs of broncho-pneumonia in both lungs. The stomach was immediately washed out with a weak solution of potassium permanganate, digitalin and strychnine were administered hypodermically, and oxygen inhalations were started. About 3 pints of normal saline with glucose were given subcutaneously, but the patient expired in a comatose condition on the 23rd of January.

Case 2.—X., an educated Hindu male, aged 28 years, of highly neurotic temperament, had been a morphine addict since 1928. The drug was administered to him after an attack of biliary colic and the habit was thus started. His father consulted the writers and, under their advice in December 1933, morphine was completely withdrawn with the help of insulin injections without any untoward effects. The patient, however, suffered from insomnia and to combat this condition a pill containing $7\frac{1}{2}$ grains of sodium barbitone was administered for 4 consecutive nights by the doctor in charge. This procured sleep but when the drug was stopped insomnia returned. This was

only partly overcome by other measures for a few weeks. The patient then secretly bought a bottle of sodium barbitone and started taking it in doses of $7\frac{1}{2}$ grains daily. One pill was enough to produce sound sleep in the beginning, but after some time he had to resort to 2 pills to obtain the desired effect. This continued for about 6 weeks during which period the patient became extremely pale and listless, suffered from tremors of the hands and feet, dimness of vision, tinnitus and thickness of speech. The drug was completely withdrawn and the patient was carefully watched. He was given a nourishing diet and a tonic mixture containing iron, arsenic and strychnine. These measures succeeded to a certain extent in the beginning, but later on it was thought necessary to administer opium in $\frac{1}{4}$ grain doses daily along with general measures. Within 3 weeks' time the patient gained in weight, started taking an interest in life, and became mentally normal. Later, opium also was successfully withdrawn.

Case 3.—F., an Anglo-Indian female, aged 25, unmarried, had much worry on account of family affairs, and suffered from sleeplessness. Under the advice of a doctor she started to take sodium barbitone occasionally. One to two pills were enough to procure her sound sleep and this was continued for some months. The patient then began to suffer from dullness and heaviness in the head, irritability of temper, breathlessness on exertion and listlessness. The drug was discontinued at once and the dangers of this form of self-medication were explained to the patient. There were no untoward symptoms and the patient regained her normal health in a month and so far as is known has not gone back to the drug.

Discussion.—An analysis of the cases of poisoning and of abuse of these drugs in this country for the last five years occurring in the reports of chemical examiners of different provinces shows that most of the cases were addicted to the use of some other drug at the same time. In some cases, barbitone, or one of its derivatives, was used by itself, but, in others the drug was taken by those using alcohol and cocaine to overcome insomnia produced by their excessive use. Persons with unstable nervous systems under worry and strain may resort to these drugs. We have seen cases where death of some near relative, losses in business, or the maladjustment of domestic affairs have induced their use, either under the advice of the family physician or independently, in order to allay the uneasiness of mind from which they suffered.

In a number of instances we have observed that although these drugs were continuously used for weeks together they did not lead to the intense type of addiction usually produced by opiates. Although the abstinence symptoms on withholding the drugs are absent and the drugs can be suddenly stopped without any difficulty, there is a distinct desire for repeating the dose for control of symptoms for which the drug is taken. We have on record cases of certain individuals who in the first instance took these drugs in order to overcome the feelings of fatigue, worry and insomnia, as they could not afford the use of expensive euphorics like alcohol, or were afraid of using opium on account of the risk of habit formation. These persons exhibited a strong desire to repeat the

dose towards the evening. The feeling disappeared rapidly after taking the dose and before the drug was actually absorbed into the system, indicating that there was a strong psychic factor.

It is believed by some practitioners in this country that drugs of this series cure drug addiction. Luminal, medinal and pronoclon are not uncommonly prescribed to combat insomnia resulting from withdrawal of drugs like opium, morphine, cocaine and alcohol. In a number of cases these addictions were overcome and beneficial results were produced, but in a few instances the individuals became habituated to the drug in addition to the original drugs of addiction.

The usual sequence of events is to start with a therapeutic dose of 5 to 10 grains for a few weeks in the form of a pill at bedtime, but soon the ordinary dose becomes ineffective and it becomes necessary to increase the dose to achieve the desired effect. As little or no tolerance is developed, toxic symptoms set in quite early after a comparatively small increase in dosage. The average toxic dose in Indians ranges between 60 to 80 grains, though untoward effects have been produced with therapeutic doses, especially in persons with damaged hearts, lungs and kidneys. The excretion of these drugs appears to be slow and may extend over a period of 5 to 7 days, and probably this accounts for certain instances of fatal poisoning after repeated therapeutic doses.

We have not come across any case where the habit had lasted for more than five years. Most of the patients were compelled to give up the habit or, if they persisted, succumbed to some intercurrent disease. Persons between the ages of 30 to 50 are more prone to their use, as at this age they are more active and subject to greater mental strains.

According to Gillespie (1934), in the majority of instances barbiturates produce nothing resembling the euphoria of alcohol or morphine. On the contrary, patients sometimes complain of discomfort following their use. Lindemann (1932) studied the psychological effects induced by small doses of sodium amytal. In healthy individuals he found there was a striking change in the emotional attitude of the subjects. There was a feeling of well-being and serenity, a feeling of warmth and friendship towards the world in general, and gratitude and appreciation for the kindness and goodness of friends and associates. There was thus a distinct production of euphoria. In psychotic patients also similar changes in the emotional reaction were observed. Our own experience in this respect is limited, but in the cases that have come under our observation among Indians the symptoms of euphoria, such as those described, were not present. The patients wanted to repeat the

dose for relief of some symptom rather than for the euphoric effects of the drug, as is the case with opium, hemp drugs and alcohol.

In this connection it may be pointed out that there is no control whatever in this country over the sale of these drugs, anyone can buy them in any quantity and their use by the lay public is increasing. In Great Britain all the barbituric acid derivatives are placed in part II of the Poisons Schedule, 1918, i.e., they cannot be dispensed without the prescription of a qualified medical man. In India, however, they are not classed as poisons and are therefore not included in any of the schedules of the Poisons Act of 1919 (amended in 1931). The need for bringing the sale of this group of drugs, as well as of the hypnotics of chloral and sulphonal series, under control in this country is very urgent.

Summary and conclusions

(1) The use of barbituric acid derivatives has greatly increased in India during the last few years. These compounds have powerful hypnotic and pain-relieving properties being only second to opiates in this respect.

(2) The fact that this group may produce toxic effects even in therapeutic doses and are cumulative in their action has not been sufficiently appreciated by the medical profession.

(3) Their repeated use is harmful and dangerous, definite pathological changes being produced in vital organs. No tolerance is developed and any increase of dose may give rise to dangerous symptoms and even fatal results. The margin between toxic and therapeutic doses is very narrow and certain individuals are particularly susceptible to the action of these drugs. Caution is therefore recommended in their use.

(4) Habit formation has occurred with these drugs in Indian subjects, but the desire for the repetition of the dose is more for relief of symptoms than anything else. They do not appear to produce euphoria like opiates, hemp drugs and alcohol. Abstinence symptoms are not produced and habit can be easily broken.

(5) The need for bringing this group of drugs under control, similar to that exercised in Great Britain, is emphasized.

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BERNHARDT'S SYNDROME

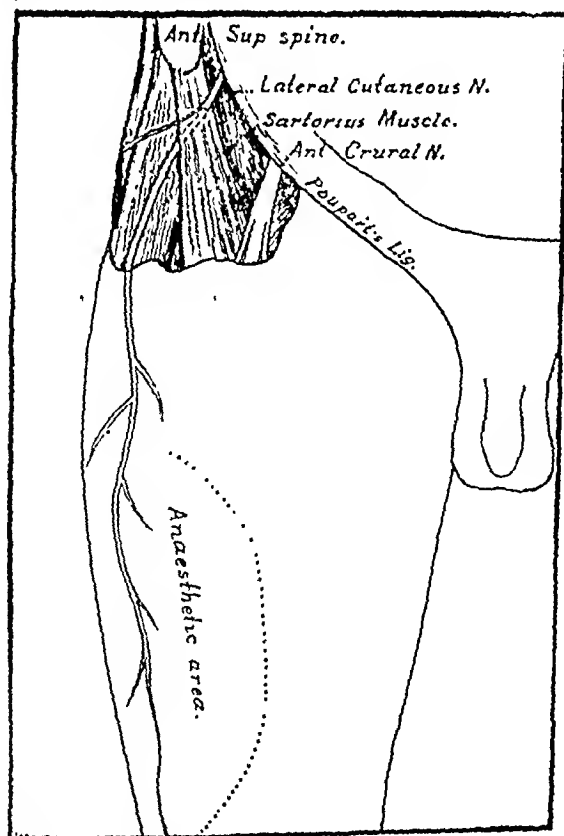
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This condition, originally described by Martin Bernhardt of Berlin (Otto Sittig, 1933), is of not infrequent occurrence in Calcutta, no fewer than twelve cases having been diagnosed among patients appearing at the leprosy clinic of the School of Tropical Medicine during the year 1934. The lateral cutaneous nerve of the thigh after emerging from the pelvis under Poupart's ligament passes either anterior to, posterior to, or through the upper end of the sartorius muscle (see figure). When it passes through the muscle and, especially if there be some fibrositis of the muscle, the nerve is liable to be constricted. In consequence of this, sensory symptoms appear in the skin area of distribution, *viz*, the lateral surface of the thigh. There is a sense of heaviness felt by the patient, and an area of skin large or small in extent is found to be anæsthetic to light touch in most cases and sometimes also anæsthetic to pain.



In India, by far the commonest cause of these symptoms is leprosy; for this reason such cases are frequently suspected of suffering from this disease and find their way to the leprosy clinic. Definite exclusion of leprosy will often afford great mental relief to the patient.

In leprosy lesions of the neural type there are, in addition to anæsthesia, almost invariably

other local signs, *viz*, keratosis, hyperpigmentation, depilation, anhydrosis, and sometimes palpable thickening of the adjacent sensory nerve branches; there may or may not be a visibly raised and erythematous margin to the affected skin area. All these are absent in Bernhardt's syndrome. Moreover in the latter condition the anæsthetic area, when mapped out carefully, is regularly round or oval in shape and confined to the antero-lateral side of the thigh; whereas the margin of the leprosy lesion tends to be irregular in shape and to extend over the front of the thigh or down to the knee.

The following are short notes on the twelve cases of Bernhardt's disease mentioned above:

1. Sk. S., age 30 years. Tingling sensation in left thigh, duration 20 days' anæsthesia to light touch and to pain.
2. B. B., age 45 years. Tingling and numbness on the lower part of the antero-lateral aspect of the thigh; duration one month; slight anæsthesia to light touch and to pain. Pyorrhœa and anæmia with a history of malaria.
3. B. G., age 30 years. Anæsthesia to light touch but not to pain in the antero-lateral aspect of the left thigh.
4. N. R., age 25 years. Anæsthesia to light touch in antero-lateral aspect of right thigh.
5. Bh., age 35 years. Complaints of anæsthetic area on left thigh for three months; on shaving the part, areas anæsthetic to light touch and to pain were found. There were similar but slighter subjective symptoms on the right side. There was a history of syphilis and gonorrhœa 15 years previously.
6. H. K., age 41 years. Anæsthesia to light touch and to pain. Feeling of numbness for 10 years. In this case the diagnosis of Bernhardt's syndrome was made in spite of the history that the patient's father had suffered from leprosy.
7. D. M., age 32 years. Complaints of anæsthesia and a burning sensation over the antero-lateral aspect of the right thigh. Objective examination was however negative for anæsthesia.
8. N. B., age 40 years. Burning and tingling in right thigh for 1 year. Anæsthesia to light touch and to pain.
9. R. U., age 45 years. Complaints of loss of feeling in left thigh for 1½ years. Anæsthesia to light touch and to pain were found on examination.
10. J. H., age 26 years. Tingling sensation in the left thigh for 1 month. On examination anæsthesia could not be elicited.
11. M. H., age 30 years. Anæsthesia of right thigh for 10 days. On examination we found anæsthesia to light touch and to pain.
12. B. P., age 38 years. Complaints of anæsthesia on the outer side of right thigh for 6 months. Anæsthesia to pain was found on examination. This patient was himself a doctor and had treated many leprosy cases.

In none of these cases was there any palpable thickening of local nerve branches, nor was there any difference in the appearance of the affected area when compared with the surrounding skin.

Anæsthesia to light touch was elicited by blind-folding the patient, touching affected and unaffected areas, and asking the patient to indicate with his finger the points touched. Pain was tested by pricking simultaneously

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THE RETICULO-ENDOTHELIAL SYSTEM IN MALARIAL HÆMOGLOBINURIA OF MONKEYS

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Introduction

WITHIN the last decade or two, several workers in different parts of the world have investigated extensively the reticulo-endothelial system and its functions. The results of their studies indicate that the system performs many important functions in health and in disease (Aschoff, 1924; Hadfield and Garrod, 1932). In 1929 therefore the writer commenced his studies on the rôle of the reticulo-endothelial system in some of the important protozoal diseases, such as malaria and kala-azar. The results relating to malaria obtained by him suggested that upon the powers of mobilization, proliferation and functional activation of the

(Continued from previous page)

with two pins the corresponding points on the two thighs, the patient being asked to indicate on which side he felt the prick most. It will be noticed that the age period of all the cases was between 25 and 45 years of age.

In contrast to the above may be mentioned two other cases which were diagnosed as suffering from leprosy:

C. S., age 36 years. Complaints of loss of sensation in the lower part of thigh extending to knee, duration 3 years. Over the affected area there was slight hypopigmentation. There was loss of pain sensation. A branch of the nerve supplying the part was palpably thickened. This was excised and sectioned; it showed dense granulomatous cell infiltration typical of leprosy.

K. S., age 28 years. Anæsthesia to light touch, pain and slight erythema of an area on left thigh. The left lateral femoral cutaneous nerve was palpably thickened.

Treatment

Syphilis, gonorrhœa and various septic conditions appear to be among the most common causes which provoke Bernhardt's disease. These should be carefully searched for and treated if present. Removal of these conditions may be sufficient to relieve the patient.

In others, the intravenous injection of stock vaccine in increasing amounts, the dose being increased only when the previous one fails to produce any marked febrile reaction.

Another form of treatment which has been found useful is diathermy, the one electrode being placed over the point of emergence of the lateral cutaneous nerve from the pelvis into the thigh, and the other over the anæsthetic area.

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phagocytic mononuclear cells composing the reticulo-endothelial system depends resistance in malaria, and that experimental damage to the system, as for example by splenectomy, results in a partial or complete failure of both natural and acquired immunity, and in a lowering of the therapeutic value of specific drugs like quinine (Krishnan *et al.*, 1932 to 1934). In the course of these investigations, the impression was gained that the incidence of hæmoglobinuria in monkeys infected with *Plasmodium knowlesi* was higher in those animals in which experimental damage or dysfunction of the system was caused. This observation led the writer to investigate the matter further and to undertake a systematic study of the rôle of the reticulo-endothelial system in malarial hæmoglobinuria in monkeys and to determine the factors that led to an enhancement or lowering of the functional efficiency of the reticulo-endothelial system. Accounts of the experiments performed, the observations made and the conclusions reached are presented in this and other papers now in preparation.

Review on malarial hæmoglobinuria in the monkey

In 1932 Napier and Campbell discovered a monkey plasmodium which has since been named *Plasmodium knowlesi* Sinton and Mulligan. This plasmodium, while causing a low-grade infection in *Silenus irus* and *S. radiatus*, produces an intense fatal infection in *S. rhesus*. In the latter species a certain number of animals dying of severe infection develop hæmoglobinuria. At first it was thought possible that *P. knowlesi* might be a highly-virulent hæmolytic strain, which on account of its virulence caused hæmoglobinuria in monkeys and that it would cause possibly blackwater fever in man; but, as it failed to produce hæmoglobinuria in the *irus* or *radiatus* monkeys, or in the few men who were experimentally infected with it (Knöwles and Das Gupta, 1932), this view was considered untenable. It was next thought that hæmoglobinuria occurred only in *rhesus* monkeys, because of the greater susceptibility of this species to plasmodium infections. In these animals hæmoglobinuria was invariably associated with a massive infection (of over half a million parasites per c.mm. of blood), and it was easy to conceive how hæmoglobinuria would readily result when during sporulation such enormous numbers of infected red cells were disrupted and a large amount of hæmoglobin was liberated into the circulating blood. This hypothesis however had to be modified in the light of the finding that all susceptible *rhesus* monkeys showing a heavy parasitization did not develop hæmoglobinuria. Only in about 30 per cent of all infected *rhesus* monkeys and in 60 per cent of the heavily-infected ones was hæmoglobinuria noticeable. An explanation

had to be found for its absence in the other 40 per cent of susceptible animals. The question was why did not these *rhesus* monkeys develop hæmoglobinuria despite a heavy infection? Is it because of their increased capacity to deal with this hæmoglobin? If so, what is the basis of this increased capacity? Is there any noticeable difference (eytological, serological or biochemical) between these two groups of *rhesus* monkeys (one showing heavy infection with hæmoglobinuria and the other showing heavy infection without hæmoglobinuria)? Why did not the *irus* and *radiatus* monkeys develop hæmoglobinuria? Is it merely because of the low-grade nature of their infection or is there any other factor concerned as well? Could the infection be intensified in these species and would hæmoglobinuria result when a heavier infection was induced in them? If so, what is the factor concerned in increasing the intensity of infection and incidence of hæmoglobinuria, and what relationship has that factor to the reticulo-endothelial system?

From the literature on malarial hæmoglobinuria in monkeys and on blackwater fever in man, and from the writer's previous studies on malaria, he came to the conclusion that through an investigation of the eytological, physiochemical and biochemical alteration of the blood with special reference to phagocytosis and proliferation of monocytes, regeneration and destruction of red cells, and through splenectomy experiments it would be possible to answer some of the above questions relating to malarial hæmoglobinuria in monkeys in a satisfactory manner.

PART I

Reticulo-endothelial cell changes in the blood of monkeys developing malarial hæmoglobinuria, and their significance

It is generally believed that from a careful study of the alterations in the peripheral blood of normal and infected animals it is possible to obtain valuable information regarding the defence processes at work during the invasion of a host by a micro-parasite. This is even more true in an infection in which the site of the struggle between host and parasite is principally in the peripheral blood; that is so because, if the infection is to be overcome completely by the host, it will be only through a rapid and successful mobilization of its defence forces at the site of the struggle, *i.e.*, in the blood, in the present instance. If this view is correct, then the variations in the blood picture seen during the course of an infection can be assumed to reflect fairly accurately the defence processes at work and through a correct interpretation of these changes an idea of the ætiological and immunological factors concerned may be obtained.

It has already been stated that the hæmoglobinuria of monkeys, which we are studying, is associated with a plasmodial infection which causes a heavy parasitization of the red cells of the blood, and that the hæmolysis of a large number of infected red cells and the consequent liberation of an enormous quantity of hæmoglobin into the circulating blood results in the hæmoglobinuric state in some of the animals, while in others the condition fails to develop. It may therefore be assumed that the factors responsible for the production of hæmoglobinuria in the first group and its prevention in the second would be manifest in the peripheral blood and that a comparative study of the two groups would be invaluable. Furthermore, as it is being increasingly recognized that the reticulo-endothelial cells (commonly known as large mononuclear cells, histiocytes and monocytes) are primarily concerned in the disposal of damaged and dead red cells, as well as of free hæmoglobin from the circulating blood, it follows that, through a study of the changes in reticulo-endothelial cells with regard to their mobilization, proliferation and functional activity during the pre- and post-hæmoglobinuric states, valuable information may be gathered regarding their rôle in the production or prevention of hæmoglobinuria. This then is the basis for the experiments recorded in this article.

Material and technique

In this experiment the monkeys used were all *S. rhesus*. The plasmodium was a pure-line strain of *P. knowlesi*. The technique used for identifying the reticulo-endothelial cells was the supravital staining technique (Napier, Krishnan and Lal, 1932). These cells were classified as monocytes and histiocytes according to their capacity to phagocytose neutral red. Total and differential counts of leucocytes were also done. Serial observations were made from the day the animals began to show parasites in their peripheral blood to the day of their death or recovery with or without hæmoglobinuria, treated or untreated. In this article the results of observation on 25 monkeys are presented. Many more were studied but those that showed mild infection were excluded. The monkeys included here are divided into two groups, group I consisting of 14 monkeys developing heavy infection and hæmoglobinuria, and group II consisting of 11 monkeys not developing hæmoglobinuria despite a heavy infection comparable to that of those in group I. By the term heavy infection is meant a parasite count of 0.2 to 0.5 million per c.mm. corresponding roughly to over 50 parasites per field. As monkeys of both groups invariably tended to die if left untreated, quinine was administered by injection to approximately half the number in each group. The untreated monkeys are included in sub-group A, and the treated in

sub-group B. The alterations in the reticulo-endothelial cells after the administration of quinine was also noted.

Results.—These are presented in tables I and II.

TABLE I

Showing the percentage of the reticulo-endothelial cells in the blood of monkeys of group I and group II. The counts represent those obtained 12 to 24 hours prior to the onset of hæmoglobinuria in monkeys of group I and are comparable with the counts in monkeys in group II which developed no hæmoglobinuria despite a heavy infection

	Total leucocytes per c.mm. of blood	Percentage monocytes	Percentage histiocytes	Percentage of total reticulo-endothelial cells
Group I	13,000	1.5	2	3.5
	10,000	1.5	2.5	4
	14,000	1	2	3
	10,000	0	6	6
	20,000	1.5	4.5	6
	15,000	2	4	6
	19,000	1.5	4.5	6
	13,000	1.5	3.5	5
	7,500	1	2	3
	10,000	0	2	2
	8,000	2	5	7
	10,000	2	3	5
	12,000	1	4	5
	9,000	1.5	4.5	6
Group II	18,000	3	9	12
	17,500	5	10	15
	8,000	6	12	18
	14,000	3	9	12
	16,000	3	8	11
	15,000	4	13	17
	20,000	2	9	11
	17,000	2	14	16
	14,000	10	20	30
	10,000	7	12	19
	12,500	7	15	22

It will be seen from table I that there is a distinct difference in the counts of reticulo-endothelial cells in the two groups of monkeys studied.

Before interpreting the results it would be profitable to review the previous work on the subject. In the past, several workers have studied the leucocyte changes in blackwater fever in man. The counts obtained by them were very variable and depended among other things on one factor, namely, the stage of the disease at which the examination was made, whether shortly after or long after the onset of hæmoglobinuria. Stephens and Christophers (1900) and Christophers and Bentley (1908) drew attention to a definite increase in the large mononuclear cells during and after hæmoglobinuria. Others have confirmed this (Ross,

1932).^{*} From these it seems that during and immediately after an attack of blackwater fever there is generally a tendency for the large mononuclear cells to increase. This may be interpreted as the host's reaction to red cell destruction, and liberation of free hæmoglobin. As it was not possible in these studies to determine the blood changes prior to the onset of hæmoglobinuria, and to correlate the subsequent leucocytic changes with either recovery or a fatal termination, no conclusion regarding the mechanism of production of hæmoglobinuria and the part played by the reticulo-endothelial cells in it was possible. Furthermore, it is now recognized that for a correct identification of the reticulo-endothelial cells and for a proper estimation of the functional capacity, the supravitral technique is the method of choice. By the use of this technique as a routine for the study of the reticulo-endothelial cells in the blood of infected monkeys in all our experiments, it has been possible to obtain more valuable information than previously. From the results in table I, it will be seen that in the pre-hæmoglobinuric state, in monkeys of group I, there is a reduction in the number of reticulo-endothelial cells compared to group II monkeys. This difference is significant so far as group I is concerned because it is present in spite of heavy infection which is a natural stimulus for the mobilization of the reticulo-endothelial cells. In group II, where the mobilization is marked, hæmoglobinuria did not result although the monkeys showed as heavy an infection as the monkeys in group I. In the course of this experiment it has been possible on several occasions to predict correctly the onset of hæmoglobinuria, or its absence, from a knowledge of the blood picture. Furthermore, it was noticed that the reticulo-endothelial cells in group I monkeys, just before hæmoglobinuria occurred, were functionally less active. The amount of neutral red ingested by them was very much less than that ingested by those in group II monkeys. From this we are led to believe that in the pre-hæmoglobinuric state there is a depression of function of these cells. Another observation made having a bearing on the subject is that in group I monkeys that developed hæmoglobinuria the maximum intensity of infection was reached in a very much shorter time than in group II monkeys. The average number of days elapsing from the day of first appearance of parasites in the blood to the day of heavy infection was 4 days in group I and 7.5 days in group II. The rapid development of infection and the suddenness of the severe hæmolysis may influence somewhat the onset of hæmoglobinuria. From such evidence we are led

^{*}In paroxysmal hæmoglobinuria according to Stephens a preliminary leucopenia is followed by a leucocytosis. Similar results were also obtained by others.

to believe that a damaged reticulo-endothelial system is a prerequisite to malarial hæmoglobinuria. When hæmolysis occurs and a large amount of hæmoglobin is liberated, under such a condition, the reticulo-endothelial cells fail to remove all the hæmoglobin, its concentration in the blood rises, the threshold limit of the kidney is passed and hæmoglobinuria results. This is probably what is happening in group I monkeys. If on the other hand the reticulo-endothelial cells are active and present in required numbers, the same amount of hæmoglobin liberated as in the first instance is rapidly engulfed and disposed of, is not allowed to pass above the threshold limit of the kidney, and no hæmoglobin is passed in the urine. This is probably what is taking place in group II monkeys.

Table II shows the fates of the infected monkeys of groups I and II. They are divided into sub-groups A and B according as they were untreated or treated.

TABLE II

	SUB-GROUP A UNTREATED			SUB-GROUP B TREATED		
	Total	Survived	Died	Total	Survived	Died
Group I showing hæmoglobinuria.	7	0	7	7	2	5
Group II showing no hæmoglobinuria.	6	2	4	5	4	1

It will be seen that the mortality was generally higher in group I than in group II and that treatment produced better results in group II than in group I. The cause of these differences was investigated by a study of the reticulo-endothelial cell response after hæmoglobinuria and treatment. The reticulo-endothelial cell counts were done daily after the onset of hæmoglobinuria and after treatment was started till recovery or death of the animal took place. The nature of the counts obtained in those that improved and lived, and in those that did not, is discussed below.

In group I-A, all the seven monkeys died of hæmoglobinuria. As four of them died soon after the onset, no more counts could be done on any of these. Of the other three, two survived for a little over 24 hours after the onset of hæmoglobinuria and one for 4 days. The large mononuclear count of one of the two former was the same as previous to the onset of hæmoglobinuria, i.e., very low. The count of the second was higher and showed a rise from

4 to 14 per cent after the attack. It, however, died despite this rise. In the monkey that lived for 4 days the count rose from 6 to 30 per cent within 24 hours of the onset of hæmoglobinuria, and later fell to 7 per cent before death, on the fourth day. Hæmoglobinuria disappeared temporarily for 48 hours after this rise and the infection also became less intense. On the day of its death an intensification and a recurrence of hæmoglobinuria occurred.

In group II-A, two out of six animals recovered from the infection and in each case the recovery was preceded by a marked increase in the number of reticulo-endothelial cells (from 11 and 17 per cent the counts rose to 28 and 35 per cent, respectively). The other four that died showed a reticulo-endothelial count varying from 11 to 30 per cent. One important noticeable difference between those that recovered and those that died was that functional activity of the reticulo-endothelial cells was marked in the former but less so in the latter. Furthermore, there was evidence of red cell regeneration in the former (reticulocyte count being 10 to 35 per cent) but not in the latter (the reticulocyte count was 1 to 2 per cent only). Death in these cases was attributable to the absence of a sufficient number of red cells to maintain life. Young and dividing monocytes, which are generally to be found in the blood of animals that recover, are invariably absent in the bloods of those that die. This suggests that proliferation of reticulo-endothelial cells is less, and replacement of old by new cells is not adequate.

In group I-B, despite treatment only two out of seven monkeys recovered. Here again recovery was associated with a high reticulo-endothelial cell count varying from 20 to 25 per cent. In the five that died, death occurred within 24 to 48 hours of the commencement of treatment and no appreciable change was noticed in the counts done before and after treatment of the attack.

In group II-B, treatment was able to produce better results than in all the other groups, only one out of five dying. Here again the improvement was associated with a marked rise in reticulo-endothelial cells. The counts which varied from 10 to 15 per cent before treatment rose to 25 to 38 per cent after treatment and during recovery. The reticulocyte counts were also very high and sometimes rose as high as 30 to 35 per cent. In the animal that died the reticulo-endothelial cell count remained constant after treatment without any appreciable change till death. The reticulocyte count was found to be very low (less than 2.1 per cent).

Summary and conclusions

From the above results it seems that both the number of reticulo-endothelial cells present as

well as the functional state of these cells are important factors in determining hæmoglobinuria. Death or recovery from the condition appears also to be dependent upon the degree of red cell regeneration. This will have to be taken into account in the consideration of the ætiology or prevention of malarial hæmoglobinuria. The study of the factors that increase and retard the phagocytic powers of the reticulo-endothelial cells and influence their proliferation appear to be of importance. They will have to be properly understood before definite conclusions are reached regarding malarial hæmoglobinuria. At the present stage it seems justifiable to draw the following conclusions :

1. That the reticulo-endothelial system probably plays an important part in the ætiology and prevention of malarial hæmoglobinuria.

2. That, when the system is depressed, as is evidenced by a low reticulo-endothelial cell count and inability to take up large quantities of vital dyes, sudden severe hæmolysis results in hæmoglobinuria.

3. That, when the system is active and functioning properly, as is evidenced by a high reticulo-endothelial cell count and ability to engulf large amounts of vital dyes, sudden severe hæmolysis does not result in hæmoglobinuria.

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THE RETICULO-ENDOTHELIAL SYSTEM IN MALARIAL HÆMOGLOBINURIA OF MONKEYS

PART II

THE RELATION OF SPLEEN TO HÆMOGLOBINURIA

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It is generally accepted that of the many ways of studying the problems relating to the reticulo-endothelial system splenectomy is one of the most valuable and popular methods. The spleen being one of the organs rich in reticulo-endothelial cells, the removal of the organ is assumed to result both in the lowering of the total number of reticulo-endothelial cells and in the diminution of the functional capacity of the remaining cells. On the basis of this assumption extirpation of the organ has been widely practised in connection with studies relating to the function of this system. The results obtained, however, have not come up to expectation in all cases. Without going into the reasons for the variable nature of the results obtained in different diseases (Krishnan, 1932) it is enough to state that, so far as the rôle of the system in monkey malaria is concerned, splenectomy experiments have yielded valuable and conclusive results. The senior writer showed (Krishnan, Smith and Lal, 1933) that removal of the spleen in all species of monkeys made the animals more susceptible to *Plasmodium knowlesi* and that it invariably resulted in an intensification of the infection followed by hæmoglobinuria and death in the majority of instances. This work has since been corroborated by (Sinton and Mulligan, 1933, and Knowles and Das Gupta, 1934). During these splenectomy experiments the senior writer noticed, for the first time, that the *irus* and *radiatus* monkeys which had never previously been known to suffer from malarial hæmoglobinuria developed the condition quite frequently after the removal of the spleen. This in fact led to a thorough study of the part played by the spleen in malarial hæmoglobinuria. Furthermore, in a previous paper the senior writer (Krishnan, 1935) from a study of the reticulo-endothelial cell alterations in malarial hæmoglobinuria had suggested that the number and functional capacity of these cells were important factors in the ætiology of the disease. It was therefore thought that splenectomy experiments would help to confirm or contradict this view as well.

Material and technique

In all 118 monkeys belonging to three species (*Silenus rhesus*, *S. irus* and *S. radiatus*) were studied. This number includes 75 monkeys

already reported upon by the senior writer (Krishnan *et al.*, 1933). Observations were made on the incidence of malarial hæmoglobinuria in all these monkeys which were composed of 56 splenectomized monkeys and 62 non-splenectomized monkeys. The operation of splenectomy was done in the same manner as reported previously (Krishnan *et al.*, 1933). Approximately half the number of animals in the splenectomized and non-splenectomized groups were given specific treatment with quinine when the infection reached a definite intensity. The results are presented in table I.

TABLE I

Showing the incidence of malarial hæmoglobinuria in splenectomized and non-splenectomized monkeys

Species of monkey	NON-SPLENECTOMIZED GROUP		SPLENECTOMIZED GROUP		
	Total number	Number showing hæmoglobinuria	Total number	Number showing hæmoglobinuria	
<i>S. rhesus</i> {	Untreated	11	4	10	9
	Treated	25	4	16	7
Total ..		36	8	26	16
<i>S. irus</i> {	Untreated	12	0	12	5
	Treated	6	0	10	1
Total ..		18	0	22	6
<i>S. radiatus</i> {	Untreated	4	0	4	2
	Treated	4	0	4	0
Total		8	0	8	2
Mixed Total		62	8	56	24

From the above table it will be evident that the incidence of hæmoglobinuria is significantly higher in the splenectomized than in the non-splenectomized group. In *irus* and *radiatus* monkeys which do not show any hæmoglobinuria in the non-splenectomized state, hæmoglobinuria occurs in the splenectomized state. Treatment with quinine reduces the incidence of hæmoglobinuria in all cases but does not prevent it. In the *rhesus* monkeys the fall is not very marked being only one-half in both splenectomized and non-splenectomized groups; but in the *irus* and

radiatus monkeys beneficial effects of treatment are more significant even in the splenectomized group. This difference between the species is probably dependent upon the distribution of the reticulo-endothelial system and upon the powers of mobilization of the factors favouring phagocytosis. In some of our previous papers (Krishnan *et al.*, 1933) we have produced indirect evidence in support of this view. The results of splenectomy therefore vary in different animal species and also in different members of the same species.

Discussion

Here it may be interesting to discuss the bearing that this experiment of splenectomy on monkeys has on the blackwater fever problem in man. The best way to do this is to compare some of the known facts regarding malarial hæmoglobinuria in the monkey with those relating to blackwater fever in man, and from them to draw inferences regarding the factors of importance in the ætiology of these conditions.

From the comparative table it is evident that hæmoglobinuria in the monkey is comparable to blackwater fever in man. The *irus* monkey corresponds to the indigenous population of blackwater areas and the *rhesus* monkey to the non-immune immigrants developing blackwater fever. The freedom from hæmoglobinuria of the *irus* and the indigenous inhabitants, and the tendency of the *rhesus* and the immigrant population to develop the condition frequently, may be explained in terms of host-parasite relationship. In the first case the long association between host and parasite, and the more successful host-parasite adjustments lead to less severe disease and less frequent hæmoglobinuria, and in the second case the shorter association and the less successful adjustments lead to more severe disease and more frequent hæmoglobinuria. In both man and monkey the condition appears to be definitely associated with malaria, damaged reticulo-endothelial system and functional failure of phagocytes. The evidence on the whole stresses the prime importance of host immunity; the species and virulence of the parasite comes only second (Giglioli, 1932).

If the above inference is correct the question naturally arises what is the nature of this immunity, or its converse susceptibility, so far as malarial hæmoglobinuria is concerned, and what factor or factors determine their increase or decrease? In several of our previous papers (Krishnan *et al.*, 1932-33) we presented evidence to show that the reticulo-endothelial system plays a very important part in the cure of malaria and that damage or dysfunction of the system increases the severity of malaria and lessens the efficacy of specific drugs. In this article we have shown that the removal

Table of comparison

Hæmoglobinuria in monkey	Blackwater fever in man
<ol style="list-style-type: none"> 1. This is caused by <i>P. knowlesi</i> which is a natural parasite of the monkey, <i>S. irus</i>. 2. <i>P. knowlesi</i> causes no hæmoglobinuria ordinarily in <i>S. irus</i> but merely gives rise to a mild low-grade infection which has a tendency to spontaneous recovery. 3. <i>P. knowlesi</i>, when inoculated into a different species of monkey (<i>S. rhesus</i>) living in a different locality (India) where infection with this plasmodium is unknown, commonly gives rise to an intense infection, hæmoglobinuria and death. 4. Malarial parasites other than <i>P. knowlesi</i> are also known to cause hæmoglobinuria under conditions of lowered resistance. <i>P. inui</i> and <i>P. kochi</i> in splenectomized animals produce hæmoglobinuria. 5. Intense infections are often associated with hæmoglobinuria. 6. Splenectomy increases the incidence of hæmoglobinuria in all species of monkeys. 7. The <i>irus</i> and <i>radiatus</i> monkeys which do not develop hæmoglobinuria under ordinary conditions get it after splenectomy, which is a recognized method of damaging the reticulo-endothelial system and of increasing susceptibility. 8. The results of treatment of hæmoglobinuria with quinine have varied according to the resistance of the animal species to malaria, i.e., they are best in the resistant <i>irus</i> and worst in the susceptible <i>rhesus</i>. Lowering the resistance through splenectomy reduces cure rate. 	<ol style="list-style-type: none"> 1. This is commonly associated with <i>P. falciparum</i>, a natural parasite of man residing in, hyperendemic malarial areas. 2. <i>P. falciparum</i> does not ordinarily cause blackwater fever in the resistant indigenous population of these areas but merely gives rise to malarial attacks of moderate to low severity. 3. <i>P. falciparum</i> infection acquired by people of non-malarious areas living in a blackwater country gives rise to severe disease which after varying periods of time is often followed by blackwater fever. 4. In a certain percentage of blackwater fever cases (about 5 to 10 per cent) <i>P. vivax</i> and <i>P. malariae</i> have been found and considered to be responsible for the disease. 5. Blackwater fever is not associated with a high parasitization. (Man gets treated and keeps down the infection.) 6. Repeated attacks of malaria, irregular dosage with anti-malarial drugs specially quinine, and long-continued residence in a hyperendemic malarial area, jointly produce a condition, in a small percentage of persons, similar to experimental splenectomy and increase susceptibility to blackwater fever. 7. Some of the indigenous population of blackwater areas sometimes get the disease when their susceptibility is lowered. The higher incidence in the indigenous children, who are relatively more susceptible than the adults, stresses the importance of host susceptibility. 8. Treatment of blackwater fever is still unsatisfactory. The cure rate is higher in the more resistant indigenous population than in the non-immune immigrants residing in blackwater areas.

of the spleen increases the incidence of hæmoglobinuria and decreases the chances of recovery, even after treatment with quinine. It is well known that the spleen is an important storehouse of the reticulo-endothelial system and that one of the recognized functions of this system is the removal of effete red cells and hæmoglobin from the circulation. So when the spleen is removed, the total amount of reticulo-endothelial cells decreases and possibly also other changes (biochemical and physico-chemical) occur that lower the functional capacity of the residual reticulo-endothelial cells. If sudden severe hæmolysis takes place under such a condition the reticulo-endothelial cells are unable to dispose of the hæmoglobin liberated, the concentration of it soon rises and hæmoglobinuria results. This view is supported by the observation that in blackwater fever the hæmolysis is extracellular or outside the reticulo-endothelial system. We have repeatedly observed the absence of proliferation of the reticulo-endothelial cells in hæmoglobinuria and the presence of it in monkeys not developing hæmoglobinuria despite a heavy infection. McNee (1932) has also recorded similar changes in the spleen and liver of one blackwater fever

case that he studied. Another fact that supports this view is the difference in the cure rate after quinine in the splenectomized and non-splenectomized animals. In a previous paper Krishnan (1933) presented evidence that the action of quinine is indirect, through stimulation of the reticulo-endothelial system. Therefore the success of treatment in hæmoglobinuria may be presumed to depend upon the capacity of the drug used to elicit an adequate response from the reticulo-endothelial system and to bring about conditions favourable for phagocytosis. If the drug is administered when the reticulo-endothelial system is damaged, as by splenectomy, then the response elicited will be below par and no appreciable benefit will be seen in most of the cases. This is exactly what is found in the experiment recorded in this paper. Therefore, we suggest that, as the powers of response of the reticulo-endothelial system in hæmoglobinuria are low and as no drug has yet been discovered that can stimulate the reticulo-endothelial system with certainty and also prevent hæmolysis, the results of treatment are unsatisfactory and vary with the natural resistance of the host.

Before closing this discussion it is interesting to refer to one point of difference that exists between hæmoglobinuria in the monkey and blackwater fever in man (*vide* para 5 in comparative table). In the former, the sudden severe hæmolysis that gives rise to hæmoglobinuria is probably caused by the sporulation of the parasites, whereas in the latter the cause of hæmolysis is as yet 'unknown'. In man, during the blackwater state malarial parasites are seldom found in the peripheral blood. They are only seen some time before or a long time after an attack. What then is the factor that causes hæmolysis of red cells? Although it has been established that there exists a definite relationship between blackwater fever and malaria two questions still remain unanswered, namely (a) how does malaria act in producing a condition favourable for blackwater fever, and (b) what brings about the hæmolysis? Regarding (a) we have produced evidence that suggests that malaria acts by damaging the reticulo-endothelial system and by retarding phagocytosis mainly through biochemical changes and with regard to (b) the question is awaiting solution. Is it a hæmolysin? If so, what is its nature and how is it produced?

Summary and conclusions

(1) Removal of the spleen in monkeys infected with *P. knowlesi* intensifies their infection and increases the incidence of hæmoglobinuria.

(2) Treatment of monkeys showing hæmoglobinuria with quinine is unsatisfactory. It is even less effective in splenectomized animals.

(3) The results recorded in this paper stress the importance of susceptibility in hæmoglobinuria and suggest that the spleen and the reticulo-endothelial system play an important part in this susceptibility.

Acknowledgment

We are deeply indebted to Lieut.-Colonel A. D. Stewart, C.I.E., I.M.S., Director, All-India Institute of Hygiene and Public Health, Calcutta, for his interest in this work and for the valuable suggestions and criticisms received from time to time.

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A PRELIMINARY NOTE ON THE CULTIVATION OF VACCINIA VIRUS ON THE CHORIO-ALLANTOIC MEMBRANE OF CHICK EMBRYO

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ALTHOUGH vaccinia virus has been propagated for centuries on the skin of healthy animals for Jennerian prophylaxis in man, its true nature is still under the cover of mystery. In the literature of the past, it is not uncommon to encounter reports in which it was claimed that vaccinia virus had been successfully cultivated on lifeless media. These reports have not been confirmed and at present such claims are rarely made.

Whereas the cultivation of vaccinia virus in lifeless media has so far not been accomplished, this agent has been cultivated by Haagen (1928), Li and Rivers (1930), Maitland and Laing (1930) and others in the presence of tissues surviving *in vitro*. Goodpasture and Woodruff (1932) in collaboration with Buddingh described a method of cultivating vaccinia virus on the chorio-allantoic membrane of chick embryo. Using the same method with certain modifications Stevenson and Butler (1933) were able to infect a large proportion of suitable eggs with vaccinia virus.

An attempt was made to cultivate vaccinia virus on the same lines at the Punjab Vaccine Institute, Lahore. The work is still in progress, this being only a preliminary note dealing with the technique, and the progress that has so far been made with the experiments.

Materials and methods

Goodpasture and Woodruff had ordinarily used bacteria-free virus in fresh infected rabbits' testes (Levaditi's neuro-vaccine) to initiate the infection. Stevenson had used a dermal strain derived from the papule on the skin of a rabbit.

The writer has used the ordinary glycerinated buffalo calf lymph to initiate the infection

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on the eggs. This 'seed lymph' although free from pathogenic organisms was far from being sterile.

Method

Hens' eggs supposed to be fertile were incubated in an ordinary chicken incubator for 10 to 12 days. The eggs were then candled to locate the embryo and air sac. Eggs containing dead or undeveloped embryos were discarded and only those containing live embryos were used. Each of these was ringed with a coloured pencil. The surface of the shell overlying the embryo was carefully cleansed with methylated spirit and flamed with a piece of burning cotton-wool. Flaming the area did not kill the embryo. All instruments were dipped in alcohol and flamed. By means of a sharp pointed knife a hole was bored through the shell and the shell membrane, thus exposing the extra-embryonic membrane, which often got damaged in the process, as evidenced by a slight trace of blood. The trauma, however, did not kill the embryo. A small quantity of the inoculum (calf lymph) was drawn up into a sterile fine capillary pipette and injected through the hole on to the surface of the chorio-allantoic membrane. The hole was then closed with melted paraffin, and the egg returned to the incubator. Incubation was continued for four days, after which the egg was opened (figure 1). Before opening, the shell was cleansed

chorio-allantoic membrane exposed. This was incised and the contents within the membrane were drawn out with forceps, leaving the membrane attached with the shell. The membrane was then carefully removed by means of a pair of forceps. In cases in which the growth of the virus had taken place, a vesicle was found on the membrane at the point of inoculation (figure 2). The vesicle was cut off with a pair of scissors. It was weighed and ground in a



Fig. 2—A vesicle is seen on the membrane.



Fig. 1—An egg has been opened.

with methylated spirit and flamed, so that the surface of the shell was aseptic. The shell and the shell membrane were then broken and the

sterilized pestle and mortar with four times its weight of 50 per cent glycerine. The mixture was stored in an ice-chest at about 40°F and was later tested for bacterial contamination and also for determining the potency of the lymph on rabbits and human beings.

Observations

The experiments were started in August 1934, and the seed lymph (buffalo calf lymph) has so far been carried on to four generations on chick embryos in succession—

$B \longrightarrow C_1 \longrightarrow C_2 \longrightarrow C_3 \longrightarrow C_4$

B = Buffalo calf vaccine lymph, small amount.

C_1, C_2, C_3 and C_4 = First, second, third and fourth generations of vaccine lymph on the membrane of chick embryos

The average yield from each egg has been 0.4 gramme and when diluted with four times its weight of 50 per cent glycerine has been sufficient to vaccinate 100 children with four insertions each. Attempts are being made to increase the yield by inoculating the embryo at more than one place and two, three and four vesicles have been obtained from a single egg without jeopardizing the life of the embryo. Samples from each of the four generations of chick-embryo vaccine lymph were tested for

TABLE

TABLE							
Chick lymph number	Date of removal	POTENCY TESTS					
		RABBITS		CHILDREN			
		Dilution					
		1:1,000	1:10,000	Date of use	Number of persons vaccinated	Number of insertions	Result of inspection after 7 days
C ₁	13-8-34	Confluent	Confluent	18-8-34	2	4	Excellent
C ₂	23-8-34	Confluent	Confluent	17-9-34	2	3	Good
C ₃	3-9-34	Confluent	Confluent	12-12-34	2	4	Excellent
C ₄	25-9-34	Confluent	Confluent	12-12-34	2	4	Good
						4	Good
						4	Good
						4	Good

bacterial contamination both aerobically and anaerobically, and no growth was obtained. The results of potency tests are given in the above table.

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A HYGIENIC METHOD OF COMPOSTING REFUSE WITH NIGHT-SOIL

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and

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UTILIZATION of all forms of organic waste including human excreta as manure has been a recognized item of agricultural practice in China and Japan for over four thousand years. The preparation of 'mud' composts (King, 1911) and the fermentation of night-soil in cisterns for direct application to fields are also of ancient origin in those countries though the scientific and sanitary aspects of the related processes were not investigated until recent years.

In many parts of India, it has long been the practice to utilize night-soil as manure without any previous treatment. It is also occasionally used for preparing 'poudrette' in combination with mud and refuse. In recent

years, however, the desirability of preparing composts from night-soil and different forms of organic wastes under aerobic conditions is being increasingly realized as efficient means of both disposal and utilization of such materials. Fowler (1927) suggested that night-soil might be dumped on refuse heaps and the mixture turned frequently so as to facilitate aeration. In a later publication he summarized the results of experiments in which night-soil was used both as a source of nitrogen and as a biological starter for the preparation of compost. Rao and Subrahmanyam (1932) conducted experiments with fresh as well as liquefied night-soil and found the latter to be cleaner and more convenient to handle than the former. Based on the previous work of Howard and Wad (1931) a method of disposing of municipal wastes has been worked out by Jackson and Wad (1932) on a big scale at Indore. Composting on a large scale is also in progress at Mysore and has been described by Mieldazis (1934).

Although much useful work has already been done in India alone, there are still various aspects of the problem which require elucidation. The present enquiry was undertaken therefore with the object of further standardizing the conditions so as to (a) prevent fly-breeding, (b) maintain high temperature in the compost heap, and thus kill out putrefactive and pathogenic organisms, (c) reduce the loss of nitrogen which invariably accompanies heavy applications of night-soil, (d) restrict the profuse decomposition of organic matter and improve the yield of the finished product, and (e) ensure maximum availability of the fertilizing ingredients present in the different components.

Experimental

Treatment of refuse with fresh diluted night-soil.—Three heaps (nos. 1 to 3) of refuse each 6 feet by 6 feet at the base, 6 feet by 4 feet at the top, and 2 feet high were made. Each heap contained 5 cart-loads of town

refuse, and the contents of each cart weighed from a quarter to one-third of a ton. The suspension of night-soil was prepared as follows. To about 15 gallons of freshly collected night-soil contained in a small drum attached to a hand cart, thrice the volume of sewage (septic-tank) effluent was added and the contents stirred together with wooden rods. As far as possible, the bigger lumps were also broken. The suspension which still contained leaves (originally used for clearing pit latrines) and other foreign bodies was applied as such to the three heaps, the contents of one drum being used for each heap. The heaps were opened longitudinally at the centre and the suspension distributed evenly along the sides of the gap thus created. The sides were then drawn in by means of manure forks, and the interior containing the night-soil carefully covered up. The surface of the heaps was kept moist from time to time by application of septic-tank effluent. At the end of one week, heaps 2 and 3 were again opened up and treated similarly with night-soil. At the end of the second week, only heap 3 received a third treatment of night-soil. All the heaps were turned once in every week. The temperature of the heaps was taken every day and was found to range from 40°C. to 50°C. for the first two weeks. Subsequently it came down to below 40°C. Except in heap 1 to which only one cart of night-soil was added, there were innumerable fly-larvæ after the first week. On opening heaps 2 and 3 it was also found that the added night-soil remained practically undecomposed while in heap 1 none of it could be seen. These observations would suggest that the fly-breeding observed in heaps 2 and 3 is due to the presence of undecomposed night-soil.

At the end of 10 weeks, when the decomposition was apparently complete, the heaps were sampled and analysed for nitrogen and ash according to Association of Official Agricultural Chemists (1930) methods (table I).

TABLE I

Heap number	PERCENTAGES		
	Total nitrogen	Ash	
1	.. 0.75	82.0	
2	.. 0.84	87.3	
3	.. 1.18	83.3	

The above experiments were subsequently extended adding 4 and 5 cart-loads of night-soil, but it was found that the nitrogen content remained practically the same (1.2 per cent). This would suggest that the nitrogen added in the later stages was almost entirely lost.

Composting with alternate layers of refuse and night-soil.—Three beds of refuse each 6 feet long, 3 feet wide and 3 inches high were prepared. One cart-load of night-soil was spread on each bed. This was covered by a layer of refuse 3 inches high over which another cart-load of night-soil was distributed. In this manner six alternating layers of refuse and night-soil were made up in each case and the entire heaps finally covered with thin layers of refuse. Septic-tank effluent was then sprayed on the surface of the heaps to maintain the moisture and to facilitate the fermentation. It was soon found however that the entire mass became hard and compact so that the effluent could not penetrate into the heaps.

The fermentation was also slow and the temperature ranged between 40°C. and 50°C. On opening the heaps it was found that the night-soil remained largely undecomposed. There was a highly offensive odour and profuse fly-breeding after one week. Even heavy applications of lime, borax or Bordeaux mixture did not improve the condition of the heaps.

Since undecomposed night-soil occurred mostly in the form of lumps, it was considered desirable that some device should be adopted to break up such lumps and then to apply the night-soil in the form of an emulsion.

Experiments with liquefied night-soil.—It is a well-known Chinese method to dump night-soil into a well or cistern and allow it to undergo spontaneous fermentation prior to application to land. The previous observations of Rao and Subrahmanyam (1932) also show that night-soil stored for even a few days undergoes liquefaction and after suitable dilution can be successfully used for treating refuse heaps. Some further experiments with liquefied night-soil were therefore carried out.

A cylindrical drum, capacity 40 gallons, was fitted up at the bottom with an iron pipe 6 inches long and 1½ inches in diameter. The pipe was provided with a valve and a hose. Night-soil, admixed with leaves and other foreign bodies, was introduced into the drum and stirred with thrice its volume of septic-tank effluent. The drum was then tightly closed with a lid. The contents of the drum were examined from time to time but otherwise left undisturbed for 10 days. It was observed that in the beginning there was frothing accompanied by the formation of a scum at the surface. In the later stages the fermentation became very much more vigorous and the liquid mass appeared as though it was boiling. After 10 days, the reaction subsided and a homogeneous brownish-yellow liquid was obtained. The leaves present along with the night-soil did not undergo fermentation but were found either floating at the surface or submerged in the emulsion. To treat refuse heaps, the emulsion was drawn through the hose by opening the valve of the outlet pipe. After the major part of the liquid had been drawn, fresh night-soil was added to the drum and again mixed with thrice its volume of septic-tank effluent. It was found on this occasion that the fermentation started very much more vigorously than before and that the liquefaction of the freshly added night-soil was complete within 72 hours. With repetition of this treatment, it was found that an increasingly active mass of liquefying organisms had been set up in the drum with the result that, in the later stages, the liquefaction was often complete within 24 hours. The undecomposed leaves were removed periodically using manure forks. Large quantities of night-soil were liquefied in this manner and used for treating refuse heaps.

Mode of heaping; importance of loose packing in the early stages.—It is well known that the maintenance of high temperature of the order of 50°C. for at least 24 hours is necessary in order to destroy weeds and pathogenic organisms. The thermal death point of many organisms varies from 50°C. to 60°C. within which range they are killed out if exposed for even a few minutes. Thus, *B. typhosus* is killed in about 7 minutes at 55°C. If the temperature is lowered by 7 or 8-degrees, it may take several

hours before all the cells are killed out. It is desirable therefore that in the compost heap, a high temperature (above 50°C.) be attained although only for a short period. The most favourable condition for a rise in temperature is provided by loose packing which ensures an adequate air supply for the active functioning of the thermophilic bacteria and fungi which are responsible for the fermentation. The importance of this principle is realized in the 'Edelmist' process developed by Kranz in Germany. The 'Beccari' process adopted in Italy consists in decomposing organic materials in closed cells provided with ventilation. According to that method, a temperature of 140°F. was recorded (Smith, 1924). In view of the above and other observations the heaps prepared for subsequent experiments were always packed loosely.

Removal of non-organic matter.—The collections of refuse from a town contain large amounts of non-organic matter such as stones, gravel, glass and tin which should be removed before any treatment is given. This is easily done by dumping the refuse at a place in long rows about 3 feet high and 3 feet wide at the base and then dragging the refuse by means of manure forks. Heavy materials like sand and stones are thus left behind. Lighter or smaller ones like pieces of glass or tin are picked up by hand and thrown away.

Composting with liquefied night-soil.—Four heaps (nos. 4, 5, 6 and 7) each measuring 6 feet long, 3 feet wide and 3 feet high were made. The materials were left loose and no attempt was made to press the heaps during the formation. The top of each heap was also covered loosely with refuse keeping it in the form of a dome.

The night-soil emulsion was applied as follows:—The top layer of refuse was drawn aside by manure forks, keeping it all along the length of the heaps so that the flat surface was visible. Night-soil emulsion was then sprayed all over the surface of the heaps, wetting the material inside. Care was taken, however, not to add an excess which would soak down to the earth. For each heap of the size mentioned above, 8 gallons of emulsion were required for treatment on the first day. From the second day up to the eighth day 5 gallons per day were added and later up to the twenty-fifth day 4 gallons of emulsion per day were sprayed.

It was observed that within 24 hours of the first treatment there was rapid fermentation, the temperature rising to 52°C. Before the end of one week it had risen to 60°C. At the end of the week the heaps were turned so as to facilitate aeration and hence keep up the high temperature. The heaps were treated again with the emulsion in the same manner and turned every week. After twenty-five days the temperature gradually came to 45°C. and then to 40°C. and later still to that of the atmosphere (21°C. to 26°C.). There was no fly-breeding in any of the heaps.

On the twenty-sixth day the treatment of heaps 4 and 5 was stopped while that of heaps 6 and 7 was continued until the sixtieth day in spite of the fact that the temperature did not show any rise. At the end of that period, the resulting manure was sieved through a half-inch-meshed expanded-metal screen, and analysed for total nitrogen.

TABLE II

Heap number	Total nitrogen, per cent
4	0.61
5	0.57
6	0.73
7	0.67

The nitrogen content was comparatively low in all the cases. Even prolonged application of night-soil for sixty days did not appreciably improve the nitrogen content, thereby showing that a considerable part of the added nitrogen was lost.

In view of the probable error introduced by parallel heaps not fermenting at the same rates, the experiments were next repeated as follows:—

One big heap was treated with liquefied night-soil in the manner already described; after twenty-five days, the heap was divided into two (heaps 8 and 9). Heap 8 was sprayed with tap water and heap 9 with night-soil emulsion. After sixty days the resulting manures were sieved and the nitrogen and degree of humidification (Jones, 1927) estimated.

TABLE III

Heap number	Total nitrogen	Organic matter	Humidification
P e r c e n t a g e s			
8	0.69	26.2	73.5
9	0.77	23.1	72.2

These observations confirm the previous results and show that after twenty-five days the addition of night-soil may be stopped from both the point of view of sanitation and nitrogen conservation.

Changes in reaction and nitrogen content during liquefaction of night-soil and aeration of the liquefied product.—The night-soil was macerated with thrice its volume of tap water and the supernatant liquid decanted into a five-litre bottle. After determining the nitrogen content of a representative sample, the residue was left for ten days in the stoppered bottle to undergo liquefaction. After that period it was found that the volume of the liquefied product had not changed appreciably. The nitrogen content of the fresh suspension was 81.8 parts per 100,000 while that of the final product was 82.8 parts, thereby showing that there was no appreciable change during liquefaction.

An experiment was next carried out with night-soil diluted to about half the previous concentration in order to follow at daily intervals the H-ion concentration colorimetrically. The results (table IV) show that, with the progress of liquefaction, the reaction tended to become less acid.

TABLE IV

Days	pH	Days	pH
1	.. 6.8	6	7.4
2	.. 6.8	7	7.4
3	.. 7.0	8	7.4
4	.. 7.4	9	7.4
5	.. 7.4	10	7.6

It appeared probable that the change in reaction was due to production of ammonia,

accordingly some trials were carried out adding sodium carbonate (5 g.) to 150 c.cm. of liquefied night-soil emulsion containing 44.8 parts of nitrogen per 100,000 and aerating the mixture. The gases were drawn through dilute mineral acid and, ammonia thus absorbed, they estimated by back-titration (table V).

TABLE V

Time of aeration in hours	Ammoniacal nitrogen, as parts per 100,000	Time of aeration in hours	Ammoniacal nitrogen, as parts per 100,000
2	1.5	14	13.8
5	3.0	17	14.7
8	6.6	19	15.9
10	10.8	22	16.5
12	12.6	24	17.4

It may be seen from the above that, with prolonged aeration, increasing quantities of ammonia are formed. This is probably partly due to the action of sodium carbonate on the albuminoids in night-soil, but the results suggest, nevertheless, that considerable quantities of nitrogen may be lost during aeration of the liquefied product by biological oxidation. An analysis of the residue showed that it contained 26.5 parts per 100,000 of nitrogen, so that it may be seen that the difference is almost exclusively due to the removal of ammonia.

Aeration of night-soil on a large scale.—Partly with a view to breaking up big lumps and partly to remove offensive odours, some experiments were carried out aerating night-soil in a macerating tank.

The tank was 35 feet long, 6 feet wide and 7 feet deep and divided into two compartments one of which had slightly over three times the capacity of the other. The bigger compartment was first half-filled with sewage effluent after which forty cart-loads of night-soil were tilted in and the mixture stirred up. After the mass had liquefied, compressed air was sent in through diffusers fitted at the bottom of the tank and the mass kept well agitated. The aeration was stopped after three hours and the suspension allowed to stand undisturbed. After twenty-four hours, fresh sewage effluent was added to make up for any change in volume. The aeration was then resumed and continued for a further period of three hours. The treatment was thus continued for some time and samples examined at intervals. For chemical analysis, the samples were collected at the same spot and at a time when the liquid was being aerated, so that there was thorough stirring of the liquid during sampling.

Total nitrogen was estimated by the Kjeldahl method, total solids by evaporation at 100° and oxygen absorption (4 hours) by determining the unused permanganate in the usual way. The results have been presented in table VI.

TABLE VI

Time in hrs.	Total solids, p. p. 100,000	Oxygen absorbed (4 hours), p. p. 100,000	Total nitrogen, as gms. per gallon	Loss of nitrogen, per cent
0	4,050	204.6	8.4	..
15	3,300	147.6	6.8	19.0
36	3,450	172.2	6.8	19.0
57	3,350	206.4	6.7	20.0
78	3,300	179.7	6.2	26.2

It was observed that after 15 hours the suspension had turned brownish-black and was almost odourless.

There was a marked decrease in total solids, oxygen absorption and total nitrogen. After that period there was not much change in total solids. The oxygen absorption showed a tendency to increase while total nitrogen showed further decrease.

The foregoing observations indicate the type of changes that are consequent on intermittent aeration of night-soil. The treatment represents a short period of aerobic condition followed by a long one of inadequate air-supply during which night-soil might partially revert to the septic condition. The results show that considerable loss of nitrogen will occur under such conditions.

Vegetation experiments with manure prepared out of refuse and liquefied night-soil.—Experimental pots were prepared in the usual way by mixing one part of sand with three of soil and the mixture (30 lbs.) treated with lime at 20 g. per pot. After about a week the following manures were applied on an equivalent nitrogen basis. (a) Farm-yard manure (N=0.31 per cent) at 72.5 g., (b) compost treated with night-soil emulsion for 25 days at 36.5 g. and (c) compost treated with night-soil for 60 days at 30.2 g. per pot, respectively. Two crops, ragi (*Eleusine coracana*) and barley, were raised. When the grains were ripe, the plants were carefully removed and the weights of grain, straw and roots determined. The results are given in table VII.

TABLE VII

Manure	Dry weights in grams		
	Grain	Straw	Roots
Experiments with ragi (average weight of 10 plants in each case)			
Farm-yard manure (a)	0.18	0.94	0.39
Compost (b)	.. 0.17	0.90	0.35
" (c)	.. 0.29	1.43	0.61
Experiments with barley (average of 9 plants in each case)			
Compost (b)	.. 0.16	0.27	0.04
" (c)	.. 0.13	0.25	0.04

It may be seen from the above that, in the case of ragi, refuse treated with night-soil for 25 days yielded a product which, on an equivalent nitrogen basis, is nearly as good as farm-yard manure while treatment for 60 days yielded a much better product. This conclusion is not supported however by observations on barley which responded better to manure prepared after treatment for 25 days than to one receiving treatment for 60 days. This apparent discordance between the two sets of observations is presumably due to some difference in the nutritional requirements, and also the duration of the two crops. Further work is in progress to throw more light on this aspect of the problem.

Discussion

The results of the present enquiry have brought out some facts of practical interest and have indicated certain useful lines of future work.

The earlier experiments have shown that application of large quantities of fresh night-soil is not only unnecessary but also undesirable. After the second week, the rate of decomposition slackens and the temperature fails to rise above 40°C. with the result that fly-breeding proceeds unchecked. The heaps also

begin to emit unpleasant odours so that it becomes necessary either to reduce the quantity of night-soil or to subject it to some pre-treatment, which would render it possible to compost large quantities of night-soil with limited amounts of refuse.

Although it has been suggested by us in a previous communication that different forms of waste vegetation can be used to supplement town refuse, it is not generally possible to command such facilities. Even if there are jungles in the neighbourhood, the cost of collecting and transporting the materials may be so considerable that it may not pay to prepare compost out of them. An alternative scheme would be to grow the required vegetation and to use it, on the spot, for composting. This again is not generally feasible because most municipalities cannot find the space required for the purpose. Even if some land were available, it would be hardly practicable to raise fresh vegetation for composting in preference to market-garden and fodder crops which bring ready cash. It would be necessary therefore to devise other means to facilitate the composting of night-soil with town refuse only.

The experiments with liquefied night-soil have shown that large quantities of that product can be successfully applied at daily intervals for a period of 25 days. A high temperature (50°C. to 60°C.) is maintained throughout that period, so that there is no fly-breeding or danger of pathogenic or putrefactive organisms persisting under such conditions. The process of liquefaction proceeds spontaneously and requires no special attention. The liquefied product can be more easily diluted and is generally more convenient to handle than fresh night-soil. There is, no doubt, some smell especially at the time of removing the liquefied night-soil from the cistern, but the heaps composted with that product do not emit such offensive odours as those treated with the fresh material. It will be seen therefore that, from the sanitary point of view, the liquefied product is far more satisfactory to work with than the fresh material.

The experiments on aerating night-soil have shown that, although it is a useful method of removing offensive odours, it is nevertheless wasteful as it leads to loss of nitrogen as ammonia; this treatment would therefore appear to be undesirable. A similar observation would also apply to continued treatment of refuse heaps with liquefied night-soil for even 25 days since it results in persistently high temperature and considerable loss of nitrogen. The resulting composts are very much poorer in nitrogen than those reported according to the Edelmist or the Beccari processes (*loc. cit.*). It is desirable therefore that the number of applications of night-soil should be reduced and the fermentation in the loosely-packed heap allowed to

proceed for just the minimum period of time required to kill out weeds, seeds and insect larvæ. The subsequent fermentation should be so controlled that the loss of nitrogen is reduced to a minimum. Further work in this direction is in progress.

Summary

(1) Heavy applications of fresh night-soil at weekly intervals result in the slackening of fermentation after one week. The temperature does not rise above 40°C. and fly-breeding proceeds unchecked. After three weeks, the added nitrogen is also mostly lost.

(2) Composting with alternate layers of refuse and night-soil is undesirable as it leads to the hardening of the mass and consequent slackening in fermentation.

(3) Liquefaction of night-soil by spontaneous fermentation has been found to be a convenient way of breaking up big lumps and eliminating other associated waste materials. The details relating to the liquefaction of night-soil and its application to refuse heaps have been described.

(4) During liquefaction, the reaction of night-soil tends to become slightly alkaline. There is no significant change in the total nitrogen content.

(5) Liquefied night-soil can be applied to refuse heaps continuously for a period of 25 days. During the major part of that period the temperature of the heap ranges between 50°C. and 60°C. Application of night-soil after that period is undesirable as the temperature tends to fall below 40°C.

(6) Aeration of liquefied night-soil leads to loss of nitrogen as ammonia. Attempts to macerate night-soil by intermittent aeration also leads to considerable loss of nitrogen.

(7) Pot-culture experiments with ragi (*Eleusine coracana*) and barley have shown that, when considered on an equivalent nitrogen basis, the compost prepared out of liquefied night-soil and refuse is at least as efficient as farm-yard manure.

The authors' thanks are due to the Mysore Compost Committee for kindly providing the necessary facilities for some of the field experiments.

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THE VALUE OF PHRENIC EXAIRESIS IN THE TREATMENT OF PULMONARY TUBERCULOSIS

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PHRENIC EXAIRESIS, or phrenicectomy as it is now commonly called, is one of the widely-used operations in the treatment of pulmonary tuberculosis. A review of the first 104 cases done at the Union Mission Tuberculosis Sanatorium was published five years ago (Frimodt-Møller and Gnanamuthu, 1930). It is now possible to review 275 cases of phrenicectomy.

The operation and its technique

In 1911, Stuertz suggested phrenicectomy, or the mere cutting of the phrenic nerve, as a method in the treatment of unilateral pulmonary tuberculosis. The results of this operation were often disappointing. The credit for the present-day success of the phrenic operation is due to Felix. He proposed the operation of phrenic exairesis, or the evulsion of the complete nerve. By this operation the continuity of the main nerve and all its branches was destroyed. Goetze, fearing the danger of tearing important structures during the evulsion, proposed an alternative method. This method consisted of the resection of a part only of the main trunk along with the resection of a part of the accessory phrenic nerve or nerves.

The phrenic nerve usually arises from the third and fourth cervical roots; additional fibres may come from the fifth also. The nerve crosses the anterior scalene muscle in an oblique direction from above downwards and inwards. Throughout the greater part of its cervical course, the nerve usually lies on the anterior surface of the anterior scalene muscle. It may cross the muscle at a high level and then the nerve is found in the medial aspect of the muscle; very occasionally the nerve is in very close apposition to the brachial plexus and then it may lie on the lateral aspect of the muscle and may cross it only at the point of insertion of the muscle. The accessory fibres to the phrenic nerve follow the first part of the brachial plexus taking their origin usually from the fifth or sixth cervical roots. They may arise as a single bundle or as a series of 2 or 3 nerves, which run obliquely downwards and inwards from the brachial plexus joining the main trunk of the phrenic nerve occasionally in the neck but more often below the level of the clavicle (Morriston-Davies, 1933).

Sometimes the phrenic nerve may be found to be bound down by adhesions and it may not be possible to evulse the whole nerve. In such cases it is dangerous to pull it violently. Our technique usually is to expose the nerve in the neck, dissect it out free from under the fascia

of the anterior scalene muscle and then use slow traction. If the nerve comes easily, the whole nerve is evulsed. If there is considerable resistance, no attempt is made to evulse the whole nerve but as much of the nerve as can be pulled out is cut off. When two or three inches of the nerve are pulled out, the diaphragmatic pull can usually be felt. In our experience if this pull is felt clearly we can expect a complete paralysis of the diaphragm, even though only a small portion of the nerve is removed and the accessory phrenic nerves are not dissected out. When the diaphragmatic pull is not clearly felt, and if the nerve breaks off, or if it has to be cut off, the accessory nerves have to be searched for and cut. In our series of cases, of those which were controlled by fluoroscopic examination only six showed incomplete or no paralysis of the diaphragm. In 5 of these the nerve broke off before the diaphragmatic pull was felt and no accessory phrenic nerve could be identified; in the other the nerve was only crushed.

The actual length of nerve removed is of little consequence provided the diaphragmatic pull is clearly felt before removal. In twenty-five cases the whole nerve measuring from 10 to 13 inches was evulsed, but in the majority from 4 to 9 inches only of the nerve were removed, while in a few even less than one inch. The average length of nerve removed was $4\frac{1}{2}$ inches; but there was no correlation between the amount of the nerve removed and the paralysis of the diaphragm as shown by the x-ray examination.

Complications

Complications met with during the operation in our earlier series of 104 cases were dealt with in our previous paper. They were injury to the internal jugular vein in one case, rupture of the dome of the pleura in another, and vomiting and shivering in a few. In the last 171 cases we have met with no complications.

Effect of phrenic evulsion

The phrenic and accessory phrenic nerves are solely responsible for the motor supply of the diaphragm. Phrenic evulsion produces a complete paralysis of the corresponding dome of the diaphragm. The muscle fibres of the diaphragm gradually atrophy and the dome in course of time is converted into a parchment-like membrane (Stanbury, 1934). The paralysis of the diaphragm is usually followed by a rise of the diaphragm in the side operated upon. The height to which the dome will rise in any particular case cannot be foretold. In some there may be no immediate rise, but it may be found three months or a year later. Pleural adhesions are one of the factors that affect the rise of the diaphragm, but this rise does not always depend upon pleural adhesions, as in some cases with extensive pleural adhesions the rise of the diaphragm has been found to be

high. Another factor that influences the rise of the diaphragm is the condition of the underlying lung—whether it is yielding or not. When there is extensive infiltrative exudation and the alveoli are filled with exudation, the lung is not easily collapsible and consequently the rise



Fig. 1.—Before phrenic exaeresis.



Fig. 2.—After phrenic exaeresis

of the diaphragm is not likely to be complete. The effect of the rise of the diaphragm is a partial collapse of the lung. This collapse is not necessarily confined to the base of the lung but is distributed throughout the whole lung as it has been observed that cavities in the middle and upper zones of the lung change in shape, size and position. Another effect of the paralysis of the diaphragm is the relaxation of the tension on the lung and also the elimination of the pumping action of the diaphragm.

Indications for the operation

Phrenicectomy can be used as the sole surgical method of treatment or in conjunction with other operative measures. Generally speaking it can be said that the indications for phrenicectomy are the same as for artificial pneumothorax and it is done as the sole surgical method in cases in which pneumothorax has failed because of adhesions. In such cases it is specially recommended for thin-walled cavities with no or only slight surrounding infiltration (Slavin, 1934). Phrenicectomy is often done as a preparatory operation to thoracoplasty. Then the object of the operation is in some cases to test the ability of the contra-lateral lung to stand the major operation, but its value in this connection is doubted by some (Head, 1934). It should be done as a preliminary to localized upper thoracoplasty as the improvement caused by the phrenicectomy may in some cases make the major operation unnecessary or in others it may improve the condition of the patient so much as to make the patient stand the thoracoplasty operation better. Phrenicectomy is also used in some cases of hæmoptysis in which an artificial pneumothorax is impossible and for which a thoracoplasty is contra-indicated. We have had strikingly good results in 3 such cases.

Phrenicectomy can be frequently combined with artificial pneumothorax on the same side when there are adhesions preventing an effective collapse. The closure of adherent cavities by combined artificial pneumothorax and phrenicectomy depends on the fact that phrenicectomy releases one of the two tensions on the lung, the tension of the adhesion to the chest wall and the tension of the diaphragmatic movement, especially when there are adhesions also to the diaphragm. While the diaphragm remains active the tension towards the root of the lung predominates and the lung, suspended between two fixed points, continues to be pulled in two directions, thereby increasing the tension on the walls of the cavities. The result of phrenicectomy is that the tension of the lung towards the root is diminished and the contracting capacity of the adhesions acting in one direction only allows the retraction and healing of the diseased lung (Slavin, 1933).

Phrenicectomy is indicated in some cases before stopping artificial pneumothorax. This is specially so when the lung has been extensively affected before the institution of artificial pneumothorax. In such cases healing is produced by extensive fibrosis and, if such a lung is allowed to re-expand fully into the pleural space, the strain on the fibrosing areas may be harmful. Further the contracting fibrous tissue may cause dragging on the bronchial tubes producing, in course of time, bronchiectasis and also possibly extensive retraction of the mediastinum with attendant symptoms, such as pain, tachycardia and irritant cough. In such cases

a preliminary phrenicectomy before stopping artificial pneumothorax diminishes the space into which the healed lung has to expand and thereby prevents or minimizes the troubles mentioned above. In our series of cases phrenicectomy has been done in 30 cases before stopping artificial pneumothorax.

Phrenicectomy may be a useful procedure in some cases to relieve symptoms such as dragging pain, irritating cough and tachycardia. In pulmonary tuberculosis frequently there are adhesions between the pleura, the lung and the diaphragm, and sometimes between the pericardium and the diaphragm; the fibrous tissue contracts and pulls on the surrounding structures causing troublesome symptoms which can in many cases be abolished or relieved by paralyzing the dome of the diaphragm on the affected side.

In certain cases of bilateral affections artificial pneumothorax on the one side and phrenicectomy for the affection of the opposite lung is advocated. A few authors report good results. In our series we had 3 such cases which had pneumothorax on one side and phrenicectomy on the other. None of these three cases improved and we consider the scope for this combined treatment is limited.

Contra-indications.—Phrenicectomy is definitely contra-indicated in cases with chronic bronchitis or asthma and also when extensive fibrosis with emphysema is present.

The value of phrenic evulsion

In judging the value of phrenic evulsion in pulmonary tuberculosis several factors have to be taken into consideration. The disease is a chronic one and rapid improvement cannot always be expected. As phrenicectomy aims at producing a partial collapse of the lung only, it is often unable to effect the dramatic disappearance of symptoms such as can be seen at times when a diseased lung is completely collapsed by artificial pneumothorax. Though the paralysis of the diaphragm immediately follows phrenicectomy, its rise and the consequent collapse of the lung is not always complete immediately after the operation. It has been already mentioned that it sometimes takes 3 to 12 months before the rise is complete.

The presence or absence of disease in the contra-lateral lung is another factor that influences the result. In assessing the value of phrenicectomy, we must also take into consideration with what object in view the operation was done—whether the arrest of the disease was expected or whether the operation was done mainly to relieve symptoms, such as pain, irritating cough or persistent hæmoptysis.

In this connection it is necessary to emphasize that a paralysis of the hemi-diaphragm by phrenicectomy is only an accessory aid in the treatment of pulmonary tuberculosis. Treatment on sanatorium lines is essential.

Phrenicectomy, as all other methods of collapse therapy, is to assist the sanatorium treatment mainly by helping to overcome those mechanical conditions which are a hindrance to improvement. The after-results of phrenicectomy on patients treated at Rists Hospital, Paris, are worth quoting. Of the 100 patients who improved after phrenicectomy 79 had, in addition, sanatorium treatment and this group had 38 patients who obtained permanent good results as compared with only 4 out of 21 who did not receive sanatorium treatment. The conclusion drawn from this is that unless the early benefit of phrenicectomy can be supplemented by the systematic rest and continuous medical supervision of the sanatorium, it is not likely to be maintained.

Analysis of results

Phrenic exairesis operations to the number of 275 have been done at the Union Mission Tuberculosis Sanatorium, Madanapalle, up to 1st September, 1934. Of these, 54 cases are excluded from detailed consideration, as 11 had the operation done as a preliminary to thoracoplasty, 30 had it done after artificial pneumothorax just before leaving the sanatorium, 4 had the operation done for non-tuberculous conditions of the lung, 3 had the operation done combined with artificial pneumothorax on the other side, 2 left the sanatorium before completing one month of treatment, 2 are still under treatment having had the operation done only recently, and in 2 no phrenic nerve could be identified.

Out of the 221 cases included for detailed analysis 1 was in stage I, 23 in stage II and 197 in stage III (*vide* Benjamin, 1934). These patients can be divided into two groups, group I comprising those on whom the operation was done as accessory to artificial pneumothorax treatment on the same side, and group II those on whom it was done as the sole surgical procedure.

In group I there were 52 patients and these received phrenicectomy during the course of artificial pneumothorax treatment as they did not derive the full benefit of pneumothorax due to the presence of adhesions. Of these 34 or 65.4 per cent were benefited by the combined treatment, 27 being discharged as 'much improved' and 7 as 'improved'. This is shown in table I.

This figure may be compared with the figure for the positive results of patients treated at the sanatorium with artificial pneumothorax before the introduction of phrenicectomy. Of 142 patients 66, or 46.5 per cent, obtained positive results. That of a group of 52 patients in whom adhesions prevented a satisfactory collapse in artificial pneumothorax and in whom therefore poorer results might be expected, yet 34 or 65.4 per cent gained improvement is good evidence of the value of phrenicectomy in such patients. It may be mentioned that only

eradicated malaria, whereas quinine had failed even by injections. His skin showed slight pigmentation of the palms within four days and the urine was positive for atabrin. This continued for about a month. His bowels were very constipated.

Case 2.—H. C., 7 years old, son of a doctor, was anæmic and exhausted by successive attacks of malaria, dengue, influenza and tonsillitis. Had still, despite quinine, benign tertian parasites in his blood in mid-December 1933, when he was given a course of atabrin consisting of 0.1 gm. twice a day for five days which cleared his blood of parasites. Within a week of beginning treatment there appeared yellow discoloration of the conjunctiva and strong yellow coloration of the skin, most marked on face, palms and soles. This increased until the boy looked as if powdered with turmeric. About the same time low pyrexia ranging to 99 or 100°F. began. Urine was yellow, atabrin-positive and continued discoloured for about six weeks, but the cutaneous pigmentation and the low pyrexia persisted and the anæmia began to get worse. A thorough investigation revealed an active streptococcal infection in the throat. Intensive anti-anæmic treatment and a course of anti-streptococcal vaccine and local anti-virus applications improved the general and blood conditions and controlled the pyrexia by the middle of March 1934, but still there remained atabrin pigmentation, though in a less marked and patchy form, on the hardened skin of palms and soles and to a lesser extent on the face.

After being apparently well for a fortnight, he suddenly on the 1st of April developed a very acute illness caused by streptococcal septicæmia localizing in a patchy lobar pneumonia. Anti-streptococcal serum was given with marked effect. At the end of this severe illness which lasted for a week and which naturally left the boy more anæmic, he was observed to have lost all residual traces of atabrin discoloration. He is now making a rapid recovery in general health and blood condition.

This case suggests that the intercurrent streptococcal infection had something to do with the atabrin retention in the system. This retention was prolonged to the extent of over three months and only when the toxin was neutralized and its depots destroyed, did the tissues part with the last traces of the drug. The explanation of how this occurs is, however, not at present clear.

A CASE OF CALCINOSIS

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In September last, I saw a Hindu female about 80 years of age who had been suffering from occasional pain in her right gluteal region for twenty-two years. I considered it to be a case of rheumatism and treated her accordingly, but with no effect. On deep palpation I felt a hard substance in the muscle. On opening the part more than a dozen calculi each about the size of a pea were extracted; each was in a different cavity. The wound healed by first intention and the patient was cured.

One of the stones was sent to the Calcutta School of Tropical Medicine where it was examined and found to be a deposit of carbonates and phosphates of calcium and magnesium with traces of cholesterol and the case was accordingly diagnosed as one of calcinosis.

My thanks are due to Major S. Nag, I.M.S., Civil Surgeon, Mymensingh, for permission to publish these notes.

A CASE OF MACRODACTYLY

By K. B. SEN ROY, B.Sc., M.B., B.S., P.M.S.

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S., a Hindu girl, aged 10 years, of the village Saraiyan, in Ghazipur district, was admitted into the hospital with abnormal enlargement of the right middle finger.

She came to the hospital for its removal, as she had been feeling its weight. It is seven and a half inches in length and seven and a half inches in diameter at its thickest part. The left middle finger is three inches in length and two inches in diameter.



The right index and ring fingers are disproportionately thicker and bent towards the thumb and the little finger respectively, as is clearly shown in the illustration. The girl uses the right thumb and the index finger to hold the handle of the grinding mill while grinding corn.

The finger was successfully amputated at the metacarpophalangeal joint by Dr. R. S. Bhargava, Civil Surgeon, Ghazipur, to whom I am indebted for permission to publish these notes from the hospital records.

CORRIGENDUM

In Lieutenant-Colonel R. N. Chopra's paper, 'Drug Addiction in India and Its Treatment', which appeared in our March issue, on p. 123, first column, fourth, fifth and sixth lines from the bottom, the words 'the incidence of addiction in British India ranges between 0.5 to 1.0 per thousand of the population' should read 'the incidence of addiction in British India ranges between 0.5 to 1.0 per cent of the population'.

Indian Medical Gazette

APRIL

ATEBRIN MUSONATE

IN this number of the *Gazette* will be found a report by Doctors Blaze and Simeons on the clinical effect of atebirin musonate in malaria in Colombo. The first results with this new atebirin compound seem to suggest very strongly that it is more powerful in its anti-plasmodial action than atebirin dihydrochloride. If the cases reported are a consecutive and unselected series, one can go further and say that they provide definite evidence that this salt of atebirin given by the parenteral route is superior to atebirin dihydrochloride administered orally, as there is no evidence to suggest that the malarial infections in Ceylon show any special amenity to treatment nor hitherto has any such striking series of results been published.

The results can be summarized shortly as follows:—

Of the 21 patients three received oral atebirin also and can be left out of consideration.

Eight patients received a single injection of 0.3 gramme of atebirin musonate intramuscularly; in two cases this completely failed to control the fever; in two it controlled the fever temporarily, but further treatment had to be given; in one it controlled the fever but parasites reappeared in the blood, so further treatment was given; and in three cases it controlled the fever completely, and no further treatment was necessary.

Nine patients received two injections on successive days (or within 36 hours, in two cases); in all the fever was controlled by this dosage, but in one parasites reappeared, so another injection was given.

Both malignant and benign tertian infections are represented in this series; the indications are that the benign tertian cases responded more readily. The cases were not of course followed up for any length of time, but whatever the final result is in these cases, the immediate result seems to have been very satisfactory.

However, we must disagree with some of the contentions of these writers. In the first place they will find their statement, that atebirin orally has no action either on the parasites or on the fever within the first three days of its administration, contradicted in practically every paper that has been published on the clinical action of atebirin. It is only necessary to cite a few papers published in this journal to refute this statement. In the first paper published on the effect of atebirin, Napier and Das Gupta (LXVII, 181) reported that the average duration of fever was less than two days after the

first administration of atebirin, and that a mean dosage of 0.525 g. was required to bring down the temperature; in this series admittedly the mean time of persistence of the parasites was more than three days, but a reduction in the numbers was always evident before the fourth day, and in some of the cases they had disappeared within the first three days. Chopra, Das Gupta and Sen (LXVIII, 425) in a slightly larger series found that in 7 out of 18 cases the parasites had disappeared by the third day, and Chopra and Sen (LXIX, 392) reported a case of very heavy malignant tertian infection in which the parasites had completely disappeared after 0.7 gramme of atebirin.

On the other hand, a number of observers have suggested that in man the action of atebirin is a little slower than that of quinine, though the statement is by no means universally accepted; now Chopra and Das Gupta (LXVIII, 493) have shown that in the plasmodium infections of monkeys atebirin is much more rapid in its action than quinine, and in these experiments the parenteral route is the one used, so that it is possible that there is some advantage to be gained in administering atebirin, whether in the form of a dihydrochloride or of a musonate, by this route. We cannot, however, accept the explanation for this given by these authors. Hecht, whom they have quoted, stated that the method he used for showing the presence of atebirin could not be used for demonstrating its absence. Further, his observations seem to suggest that by whatever route atebirin is given it is 'selected' by the liver, as are all dyes of this group, though in the case of parenteral injections it will take a more devious course before reaching this organ.

Again it is difficult to see in what way the work of Tropp and Weise supports Doctors Blaze and Simeons' contention; the excretion of atebirin in the urine commences on the first day and rises sharply reaching a maximum on the fourth or fifth day of its administration; this excretion curve does not differ in any way from that of many other drugs and certainly does not suggest a latent period whilst the liver is becoming saturated.

It seems to us far more likely that the superiority of atebirin musonate over the hydrochloride salt—if this can be established—will be attributable to differences in chemical combination, and associated differences in its dissociation, solubility or diffusibility, than to differences in the route by which it has been administered in these cases, or more probably still both the route and the chemical combination of the drug will be shown to be important factors.

Even after using it clinically for centuries, we still have no exact knowledge regarding the action of quinine on the malarial parasite; our ignorance regarding the action of atebirin is, if possible, more complete. A certain amount of work on the distribution of quinine in the body

after its administration by different routes has been done, but very little on the distribution of atebtrin; more exact methods than that devised by Hecht will have to be evolved. If further work shows that the parenteral route is more effective than the oral, or that atebtrin musonate is more effective than atebtrin dihydrochloride, not only will an advance in the treatment of malaria have been made but we shall have more data on which to work out the action of these drugs on the parasite.

However, the important matter on hand is the practical value of the observations of the two workers, and, if the results reported are taken at their face value, we must admit that an advance of very great practical importance has been made. Reports from Ceylon that we have received through a private channel indicate that the hospital experiment reported in this number has already been applied in the field. In a malaria-stricken area, in a village where practically the whole population was affected with malaria and had already suffered a heavy mortality, a single intramuscular injection was given to each of about a hundred of the villagers; the immediate effect was so marked that the rest of the inhabitants of the village demanded injections on the next day; on the third day a second injection was given to each patient, and in that village the epidemic, as an epidemic, was ended. It cannot of course be said that the malaria was ended; we know nothing about the relapse rate following this abbreviated atebtrin course, but as an emergency measure it was very effective.

The importance of an experiment of this kind must not be exaggerated; we know that quinine given by the mouth will cure malaria and that, had each one of these villagers taken a course of quinine when he or she first had fever, the results would probably have been very nearly as good; further it requires less skill to administer a tablet of quinine than to give an intramuscular injection; on the other hand it takes a much more elaborate organization to ensure that 100 illiterate villagers of all ages take three, or even two, tablets of quinine a day over a period of seven days, than to give them two injections of atebtrin musonate at an interval of 24 hours.

However, considering the matter dispassionately, these first reports do seem to indicate that another advance in malaria therapy has been made.

The two main complaints made against atebtrin have been its reputed slower action than quinine and its higher price; atebtrin musonate meets the first complaint completely, and the economic difficulty of using it on an extensive scale, in an epidemic for example, should be largely overcome, if two doses will control a malarial attack. We shall await further reports with considerable interest.

CALCUTTA MEDICAL COLLEGE 1835—1935

At the beginning of the last century medical education, as it was conducted in Great Britain and in many countries in Europe at that time, was non-existent in Bengal or in any other province of India. Before the advent of the British, the people of India had depended for medical attention on the *vaids* and *hakims*, the practitioners of the indigenous systems. These systems had undoubtedly at one time been far ahead of their European contemporaries, but through the centuries they had degenerated, as all dogma-bound systems must degenerate, and were mainly represented at that time by poorly educated and often illiterate quacks.

For the treatment of the servants of the East India Company and for the Army in India doctors from Europe had to be imported. These men naturally trained assistants in their hospitals, but there was no systematic course for these assistants to go through and they acquired no status. This was an unsatisfactory state of affairs which led through natural stages to the establishment, first, of a small medical school. It was probably not the failure but rather the success of this medical school, which had demonstrated the potentialities of such a scheme, that led to its abolition after a career of about a dozen years and to the establishment in the year 1835 of the present medical college, where a systematic medical training strictly in accordance with the methods adopted in Europe was given.

The government order establishing this college provides interesting comparisons with the state of affairs at the present day. The work of instruction was to be carried out by the superintendent and one assistant. After instructing fifty students in anatomy, surgery, medicine and pharmacy, issuing half-yearly reports, and conducting examinations, the superintendent would, we should imagine, have little time, or inclination, to indulge in private practice, but nevertheless there was an explicit clause forbidding him to do so. This wise principle was abandoned in later years and has only recently been applied again. For clinical instruction five local medical institutions were named. However, soon after its establishment the college organized its own 'clinics', though it was not until 1852 that a hospital of any size was built; in that year, the main building of the hospital as it stands to-day was opened by Her Majesty's Governor-General in India, the Earl of Dalhousie.

In the year 1857 the Calcutta University was founded and the college was affiliated to it in the same year.

The principle of giving training strictly in accordance with the system adopted in Europe has been followed throughout the years and the

medical college has seldom lagged far behind the medical colleges of Great Britain in its adoption of new methods, either of treatment or of instruction. From its modest beginnings with a superintendent and one professor, it now has a principal and seventeen professors, the students have increased from 50 to 655, and in the medical college compound there are half a dozen buildings each almost as large as the original block. When the new casualty ward is built the total number of beds available will be 738 and we imagine that the ground space of the compound will have reached saturation point; subsequent extensions, and we hope there will be many, will have to be upwards.

The college has had many distinguished professors who have left their mark on medicine

in general, and on tropical medicine in particular, and an even larger number of distinguished students who have carried its fame throughout India and across the seas to other lands. The present staff and students of the college have behind them a great tradition and therefore a great responsibility. The changes of the staff during the last few years have been very considerable, and the vast majority of the professorships are now occupied by 'non-service' men; even if these men have not the tradition of the 'service' behind them they have the tradition of the college, and we have every reason to hope that they will shoulder this responsibility, as their 'service' confrères have done in the past, and both maintain and add to the fame of the Calcutta Medical College.

Special Article

TONSILLECTOMY BY A COMBINATION OF DISSECTION AND GUILLOTINE OPERATION

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ONE of the main considerations in the removal of tonsils is the control of hæmorrhage and the plea for writing the present article is to indicate a method which reduces the hæmorrhage to a minimum and at the same time effectively removes the diseased tonsils. Many a patient's guardians are afraid of the bleeding and it is no less embarrassing to the operator when it occurs to any marked extent. An ideal operation should aim at complete removal of the tonsils with the capsule intact, without injury to the fauces or the soft palate. Complete removal except in the case of the deeply buried tonsils can be effectively carried out with an ordinary guillotine, but one often comes across cases in which the pillars of the fauces or the uvula have been injured, and in the case of the deeply buried tonsils the instrument is often ineffective and sufficient portions of the diseased tonsils are left behind which overgrow in no time and keep up the focus of infection for the removal of which the operation was mainly undertaken. To obviate this difficulty one has to resort to dissection but this entails considerable bleeding. To meet these difficulties the following combined method has been adopted for the last year at the Thomason Hospital, Agra, and it has given uniformly good results without a single mishap in the numerous operations undertaken during the period. The method outlined below is applicable in the removal both under local and general anæsthesia, the former being the method of choice

in the case of adults, and the latter in the case of children and females and in adults with fibroid tonsils.

Preparation.—Any septic foci in the mouth, as for example carious teeth and alveolar abscesses, are at first suitably dealt with. The patient is given an antiseptic alkaline mouth wash for a couple of days, and to guard against hæmorrhage calcium lactate, grains x, is given thrice a day for a couple of days before the operation. In cases which are going to be done under general anæsthesia, a dose of castor oil is administered on the eve of the operation and a soap-water enema the next morning.

Operation under general anæsthesia.—There are a number of different patterns of guillotines, but the one that has given uniformly good results in the writer's hands is the Clayton's instrument. It has got the advantage of having detachable blades with rings of different sizes, and by a spring and screw action it clamps the pedicle and gradually crushes and cuts through it, and completely arrests the hæmorrhage. The other special instruments required are a Davis' mouth gag, a Mayer's tonsil enucleator, a pair of instruments with serrated edges and a point, a vulsellum, about four sponge-holders, a Shipway's anæsthesia apparatus and, as most of the tonsil cases have adenoids also, it is an advantage to keep a La Forge's adenotome also at hand. The Davis' mouth gag has the advantage that, while keeping the mouth open, it keeps the tongue depressed and provides anæsthesia through a tube attached to the tongue depressor and keeps the anæsthetist out of the way. The Shipway's apparatus has the advantage that, as soon as the anæsthesia has been induced with chloroform, ether or a mixture of ether and chloroform can be turned on. If a forehead light or a lamp with condensor and a forehead mirror are available, besides the

anæsthetist, one does not require more than one assistant.

The anæsthetist and the assistant should know their jobs well. The assistant should be very quick in handing over instruments and swabs which are made out of cotton-wool soaked in an antiseptic lotion, such as 1 in 100 carbolic, and squeezed dry. If a forehead light or a suitable lamp and a forehead mirror are not available, one more assistant is required to throw light into the patient's mouth with an ordinary electric hand torch. The patient having been placed in the dorsal position, a sand bag is placed under the shoulders so as to hang the head low and prevent any blood being inhaled. Two sterilized towels are slipped under the head, one of these being spread under the head and the other wrapped round it and the body is covered with a sterilized sheet.

The anæsthesia is induced with ehloroform with the ordinary mask of the inhaler and, as soon as the patient is under, the face is swabbed with ether, and the Davis' mouth gag inserted. The throat is cleaned of any saliva that may have collected in the meantime, and the surgeon takes his position on the right side of the patient, the chief assistant with the instruments standing to the right of the operator and the anæsthetist on the left side of the patient's head. The mouth gag is dilated and a careful watch kept on the patient's respiration, because it often happens that as soon as the patient's mouth is fully dilated the patient holds his breath. If this happens, the mouth gag is relaxed and breathing is quickly re-established.

Under good illumination the tonsil is caught with the vulsellum, pulled towards the middle line, the point of the dissector is passed under the anterior pillar of the fauces and the latter is lifted up from the tonsil. The serrated edge of the enucleator helps in separating the pillars from the tonsil and its attachments above and below without injuring the uvula. This separation is carried on till a narrow pedicle is left. In the meantime a careful watch is kept on the patient's breathing and colour of the oozing blood; if the latter appears to be dark it means insufficient breathing and the mouth gag is at once relaxed when the breathing restarts freely. If there is any cyanosis as indicated by the dark colour of the blood, oxygen should at once be connected from a cylinder, which should be always kept at hand, to the Shipway's inhaler. This quickly improves the colour of the patient and obviates any danger of asphyxia. At the same time the throat should be thoroughly swabbed out.

As soon as the tonsil is sufficiently free, the vulsellum is removed and slipped through the ring of the Clayton's guillotine and the tonsil is caught with it and pulled towards the middle

line. The vulsellum after application is handed over to the assistant who keeps the tonsil suitably pulled towards the middle line and the ring of the guillotine is slipped over the tonsil on to the pedicle and its distal edge passed well behind the tonsil. The guillotine is manipulated with the right hand in such a way that, while the distal edge of the ring is well behind the tonsil, the proximal edge of the ring should lie between the anterior pillar of the fauces and the tonsil. This becomes easy if the operator with his left index finger exerts a little pressure over the anterior pillar slightly behind the edge, thereby effectively pushing the tonsil through the ring of the guillotine.

The uvula is inspected to make sure that it does not lie in the ring of the guillotine and this is rarely the case if the proper size of blade is selected. Having ascertained these points, the operator pushes his thumb into the proximal ring of the guillotine and presses it gently down. Any pressure with the left finger over the anterior pillar of the fauces is removed to avoid button-holing the latter. The proximal ring of the guillotine is then pressed in as far as it will go and this constricts the blood vessels in the pedicle. The thumb ring is then gradually turned thereby crushing the pedicle and cutting through it; the tonsil then comes away with the vulsellum.

A swab on a sponge-holder is then pushed into the bed of the enucleated tonsil and kept pressing laterally from three to five minutes and an iced towel is placed under the jaw. This almost completely stops the bleeding and, if any still persists, the ordinary swab is replaced with one soaked in hydrogen peroxide thoroughly squeezed.

While the hydrogen-peroxide swab is being applied another ordinary swab on a sponge-holder should be kept ready at hand to remove quickly the froth produced with hydrogen peroxide and to save the patient from being choked.

Having stopped all oozing the operator goes over to the left side of the patient, the assistant remaining on the right and enucleation of the right tonsil is begun in the same way.

Any adenoids present are then removed with the La Force's adenotome which is passed behind the soft palate and kept gently pressed against the posterior wall of the pharynx keeping the instrument in the middle line. With the thumb, the ring of the blade is pulled out and any adenoid tissue pushed into the box of the adenotome is shaved off by pushing the blade home with the thumb. This instrument has the advantage over the ordinary Gottstein's curette in that there is no tearing and stripping down of the mucous membrane of the posterior pharyngeal wall and so no tags are left behind which are often the source of bleeding. The removal of adenoids is followed by smart bleeding, which wells up through the

nose. To stop this bleeding a fairly big sponge is pushed well behind the soft palate and pressed against the posterior pharyngeal wall. At the same time cold water is poured on the patient's head and the face is splashed with a cold towel and this stops the bleeding very quickly.

Removal under local anaesthesia.—This can be done without any assistant if a good forehead light or a suitable lamp and a forehead mirror are available. After painting the throat with 5 per cent cocaine 1 to 2 per cent solution of novocaine is injected into the bed of the tonsil and into its upper and lower pole with a Dan Mackenzie's tonsil syringe. The addition of a little adrenalin chloride solution effectively controls the hæmorrhage, but it has the disadvantage that it sometimes gives rise to reactionary bleeding, though this is rarely profuse. The operation is done with the patient seated in a chair opposite the operator, the steps of the operation being the same as under general anaesthesia.

Post-operative treatment.—The patient is kept lying on the side with a kidney tray close by to receive any vomit, and a few sponges on sponge-holders to swab out the mouth. A cold towel is kept round the neck for some time and when the patient comes round he is given bits of ice to suck. The throat is frequently sprayed out with pure hydrogen peroxide and in between the sprays the patient gargles with an antiseptic alkaline lotion.

Calcium-lactate powders are continued for the next forty-eight hours. The patient is not given any feed till the evening, only ice and lemonade being allowed. Later on barley water, tea or soup may be allowed, milk being unsuitable, as it sticks in the throat which becomes

difficult to clean. After every feed the mouth is sprayed and gargled. If the pain is severe as often happens towards the end of the day, a powder containing aspirin and caffeine is administered and fomentations applied to the neck or a powder containing equal parts of orthoform and anæsthesine is blown over the fauces. No solid food is allowed for the first three days, after which semi-solid food is commenced, gradually going on to the solid diet. On the day following the operation the fauces are seen covered with a white slough which gradually disappears under hydrogen-peroxide sprays and antiseptic gargles, taking about a week to disappear completely.

Under the technique described above there is rarely any troublesome hæmorrhage, but if any occurs it should be completely arrested before the patient leaves the operation table. Some of the methods to arrest the bleeding have been already described above; any smart bleeding should be controlled by the application of an artery forceps—Schumacher's type being particularly useful—and a ligature. For any general oozing the tonsil bed should be packed with a strip of gauze soaked in hydrogen peroxide and, if this is also ineffective, a roll of gauze is packed in the tonsil bed and the pillars stitched over it with a couple of stitches. Some special instruments, *e.g.*, Watson William's hæmostat, have been devised for the purpose, but where the ordinary means to arrest the hæmorrhage fail, which has never been known to occur under the technique described above, these instruments are rarely of any use, and actual ligature of the bleeding point, or stitching of the pillars over a piece of gauze, has to be resorted to.

Medical News

CALCUTTA MEDICAL COLLEGE CENTENARY

DURING the early part of February the Medical College, Bengal, celebrated its centenary. On 4th February in the presence of a large gathering of present and past students and professors, and of a large number of visitors, the Honourable Sir Bijoy Prosad Singh Roy, Kt., M.A., B.L., Minister in charge, Local Self Government Department, Government of Bengal, the President of the Executive Committee of the Medical College Centenary, opened the proceedings, and His Excellency the Right Honourable Sir John Anderson, P.C., G.C.B., G.C.L.E., Governor of Bengal, laid the foundation stone of the new Casualty Ward which is to be built to celebrate the occasion. The money for this new ward has been raised by public subscription. Up to the present a sum of 3 lakhs has been collected, but for the full scheme that is contemplated a sum of 5 lakhs will be required.

A series of scientific lectures had been arranged and these were delivered during the week in the main lecture theatre of the college. A scientific exhibition had been organized in the various departments of the college and in the associated hospitals and institutions, and in a series of temporary booths in the

grounds; the exhibition of pathological specimens was of special interest.

A very large number of old students now working in other places in Bengal and in more distant parts of India took this opportunity to visit Calcutta and attend the various social and scientific functions. The whole proceedings were a great success and worthy of the unique occasion, the celebration of the centenary of India's most famous medical college. Much credit is due to the organizers and especially to the secretaries of the various committees, Lieutenant-Colonel T. C. Boyd, I.M.S., the Principal of the College, Dr. M. N. De, and Dr. A. C. Ukil, on whom, we have little doubt, a very large bulk of the hard work devolved.

POST-GRADUATE INDIAN STUDENTS AT THE NEW MEDICAL CENTRE IN LONDON

TWENTY-ONE post-graduate Indian medical students visited the medical section of British Industries House, London, during January this year.

They attended under the leadership of Mr. J. S. Aiman, Warden of the Indian Students' Union Hostel

attached to University College, and although only fifteen originally signified their intention to be present, six others cancelled their afternoon's lectures, so as not to miss an opportunity of inspecting the only composite exhibition of its kind in the world.

As future medical practitioners, hospital officials, and members of the Indian Medical Service, the visitors showed keen interest in everything they saw—and that was a great deal.

This section of British Industries House carries out in the sphere of pharmacy and surgery the general principles which mark the House as the greatest advance in Empire Trade development yet evolved. Exhibitors include manufacturers of the latest appliances and equipment in use throughout the profession.

It was not as a permanent exhibition that the section attracted the visitors' interest, but as a buying centre where all their needs can be satisfied under one roof.

The saving of time to hospital executives in thus being able to inspect and choose their requirements from a single hypodermic needle to a complete ward or operating theatre, all gathered together compactly and displayed under actual service conditions, is inestimable. The recent equipment of an extension to Barnsley Hospital at British Industries House is a case in point, and the Barnsley authorities calculate that, travelling only from Yorkshire, their reduced time and expenses were very considerable.

The great saving in time and trouble, not to mention assurance of up-to-date-ness in everything bought, to Indian doctors and hospitals that the establishment of this centre effects, was the aspect which appealed to to-day's visitors, whose spokesman said that nowhere in Europe or the world at large are similar advantages obtainable.

The medical centre occupies approximately twenty thousand feet of space in the building and functions under a strong advisory council composed of members of the staffs of the leading London hospitals.

The area is divided into two sections, one comprising a permanent display of hospital equipment, medical and surgical requisites, dressings, pharmaceutical preparations, hospital fittings and so forth, and the other a model hospital suite including two completely furnished operating theatres, a twelve-bed ward and solarium. This suite is presented as an example of modern hospital layout and equipment.

THE TENTH INTERNATIONAL CONGRESS OF THE HISTORY OF MEDICINE

THE Tenth International Congress of the History of Medicine will take place in Madrid, Spain, from the 23rd to 29th September, 1935. English will be one of the official languages of the Congress. The Congress fee is 100 pesetas.

Medical men desirous of attending the Congress should write to the Señor Secretario Del X Congreso Internacional De Historia De La Medicina, Palacio de la Academia Nacional de Medicina, Calle de Arrieta, 12, Madrid (Spain).

Papers for the Congress should be submitted in time to be received by 1st June, 1935.

BENGAL MEDICAL ACT

THE following extract from a Government notification regarding a draft of amendments, which, in exercise of the power conferred by sub-section (1) of section 33 and clauses (b), (c) and (d) of sub-section (2) of section 33 of the Bengal Medical Act, 1914 (Bengal Act VI of 1914), the Governor in Council proposes to make in replacement of the rules and forms previously published, is published for the information of persons likely to be affected thereby.

The draft will be taken into consideration on or after the 15th of April 1935, and any objection or

suggestion received by the secretary before that date will be duly considered:—

Draft amendments

Rules under clause (d) (i) of sub-section (2) of section 33 of the Act.

Procedure to be followed in conducting any enquiry referred to in proviso (b) to section 17 and clause (a) of section 25 of the Act.

Whenever information is received that a medical practitioner, who is an applicant for registration, or whose name has already been registered, has been guilty of conduct which *prima facie* constitutes infamous conduct in a professional respect, the Registrar shall make an abstract of such information and of such further information he may have subsequently obtained.

Where the information in question is in the nature of a complaint by a person or body charging the practitioner with infamous conduct in a professional respect, such complaint shall be made in writing addressed to the Registrar, and shall state the grounds of complaint and shall be accompanied by one or more declarations as to the facts of the case except when the complaint is by a government department.

Every declaration must state the description and true place of abode of the declarant, and where the fact stated in a declaration is not within the personal knowledge of the declarant, the source of the information and grounds for the belief of the declarant in its truth must be accurately and fully stated.

(1) The abstract and all other documents bearing on the case together with any complaint that may have been lodged shall be submitted by the Registrar to the President, who shall, if he thinks fit, instruct the Registrar to ask the practitioner by means of a registered letter for an explanation within a time to be fixed by the President. After the expiry of that time the documents with the explanation, if any, shall be referred for consideration to a Penal Cases Committee which shall be appointed by the Council. The Committee shall have power to cause further investigation to be made and further evidence to be taken and, if necessary, obtain further legal or other advice.

The Committee shall report to the Council, and if the Council consider that the case is one in which an enquiry ought to be held by the Council, the President shall direct the Registrar to take steps for the institution of an enquiry and for having the case heard and determined by the Council.

The enquiry shall be instituted by the issue of a notice in writing, on behalf of the Council, by the Registrar, addressed to the practitioner. Such notice shall specify the nature and particulars of the charge, shall inform the practitioner of the day on which the Council intend to deal with the case, and shall call upon him to answer the charge in writing and to attend before the Council on that day.

The notice referred to in rule 9 shall be sent at least twenty-one days before the date of the enquiry, and shall be accompanied by a copy of section 17 or 25 of the Act, as the case may be, and of the rules to regulate the procedure for conducting any enquiry referred to in those sections. A copy of the notice should at the same time be sent to the complainant, if any.

In every case in which the Council resolve that an enquiry shall be instituted and a notice for an enquiry is issued accordingly, the complainant (if any) and the medical practitioner charged shall, upon request in writing for that purpose signed by him or his legal representative, be entitled to be supplied by the Registrar with a copy of any declaration, explanation, answer or other document given or sent to the Council by or on behalf of the other party, which such other party will be entitled on proper proof to use at the hearing as evidence in support of or in answer to the charge specified in the notice of enquiry.

Any application made by the medical practitioner between the date of issue of the notice and the day named for the hearing of the charge shall be dealt with by the President in such manner as he shall think fit.

All material documents which are to be laid before the Council as evidence in regard to the case shall be printed, and a copy shall be furnished to each member of the Council before the hearing of the case.

At the hearing of the case by the Council, the complainant and also the practitioner may be represented or assisted by a legal representative.

Where a complainant appears personally or by a legal representative, the order of procedure shall be as follows :—

- (1) The Registrar will read to the Council the notice of the enquiry addressed to the practitioner.
- (2) The complainant will then be invited to state his case himself or by his legal representative and to produce his proofs in support of it. At the conclusion of the complainant's proofs his case will be closed.
- (3) The practitioner will then be invited to state his case himself or by his legal representative, and to produce his proofs in support of it. He may address the Council either before or at the conclusion of his proofs, but only once.
- (4) At the conclusion of the practitioner's case, the Council will, if the practitioner has produced evidence, hear the complainant in reply on the case generally, but will hear no further evidence except in any special case in which the Council may think it right to receive such further evidence. If the practitioner produces no evidence, the complainant will not be heard in reply, except by special leave of the Council.
- (5) Where a witness is produced by any party before the Council, he will be first examined by the party producing him, and then cross-examined by the adverse party, and then re-examined by the party producing him. The Council may decline to admit in evidence any declaration where the declarant is not present for, or declines to submit to, cross-examination.
- (6) The chairman of the meeting may put questions to any witness, and members of the Council, through the chairman, may also put questions to any witness.

Where there is no complainant, or no complainant appears, the order of procedure shall be as follows :—

- (1) The Registrar will read to the Council the notice of enquiry addressed to the practitioner and will state the facts of the case and produce before the Council the evidence by which it is supported.
- (2) The practitioner will then be invited to state his case himself or by his legal representative, and to produce his proofs in support of it. He may address the Council either before or at the conclusion of his proofs, but only once.

(1) Upon the conclusion of the case the Council will deliberate thereon in private, and at the conclusion of the deliberations the chairman shall call upon the Council to vote on the question whether the medical practitioner charged is guilty of infamous conduct in a professional respect.

(2) If the Council, by a majority of two-thirds of the members present and voting at the meeting, find the medical practitioner guilty of infamous conduct in a professional respect, the Council shall direct the Registrar not to register his name, if he be an applicant for registration, or to remove his name from the register of registered practitioners, if he is already a registered practitioner or to warn or to censure him.

When the registration of the name of any practitioner is refused, or when the name of any registered practitioner is removed from the register in accordance

with the provisions of the preceding rules, the Registrar shall forthwith send notice of such refusal or removal to the practitioner, by a registered letter addressed to his last known address. The Registrar shall also send, forthwith, intimation of any such refusal or removal to the body or bodies from whom the practitioner received his qualification or qualifications, and shall request them not to admit him without previous reference to the Council to any examination for any new qualification, which is registrable in the register of registered practitioners. If a name is removed from the register, the Registrar shall issue a notification in the *Calcutta Gazette* announcing the removal and forward a summary of the proceedings and findings to the medical journals for publication.

INDIAN MEDICAL COUNCIL

COLONEL H. C. BUCKLEY, Inspector-General of Civil Hospitals, Bihar and Orissa, has been duly nominated by the Government of Bihar and Orissa under clause (a) of sub-section (1) of section 3 of the Indian Medical Act, 1933 (XXVII of 1933), as a member of the Medical Council of India vice Lieutenant-Colonel P. S. Mills, I.M.S., resigned.

THE PUNJAB MEDICAL COUNCIL

JUDGMENT has been delivered by a first class magistrate, Ambala city, in a case under section 23 of the Punjab Medical Registration Act II of 1916, under which one Pars Ram, an unqualified medical practitioner, described himself as a registered medical practitioner. The accused has been convicted and sentenced to pay a fine of Rs. 100 on a complaint lodged by the Punjab Medical Council.

THE ALL-INDIA OPHTHALMOLOGICAL SOCIETY

IN continuation of the previous notice, the fourth conference of the All-India Ophthalmological Society will be held in Madras, from the 22nd to the 24th April, 1935, under the presidency of Lieutenant-Colonel R. E. Wright, I.M.S. One session will be devoted to a discussion on Nutritional Disorders of the Eye in which Lieutenant-Colonel Sir J. N. Duggan, Dr. S. K. Mukerjee, Lieutenant-Colonel E. O'G. Kirwan, Dr. B. K. Narayana Rao and others will take part.

All ophthalmic surgeons who are not already members of the Society are requested to join and help to make the conference a great success. The Society has over 110 members on its rolls. The subscription has been reduced to Rs. 10. Application for membership may be made to Dr. G. Zachariah, 'Flitcham', Marshall's Road, Egmore, Madras, or Dr. B. N. Bhaduri, 10-5-A, Wellington Street, Calcutta.

THE NATIONAL BIRTH CONTROL ASSOCIATION

THE National Birth Control Association has appointed a medical sub-committee consisting of practitioners actively engaged in the teaching of contraception. The object of this committee is to collect, co-ordinate and from time to time draw up for publication by the N. B. C. A. authoritative information on all aspects of contraception, for the use of the medical profession.

This committee is in consultation with research workers, manufacturers, birth control clinics (both voluntary and under the public health authorities) and doctors engaged in teaching contraceptive methods throughout the country.

Although much valuable experience exists, the results of which are at the disposal of the N. B. C. A., the whole subject is still at the research and experimental stage, and it is necessary to be constantly reviewing and re-assessing the methods in current use.

This committee would therefore be glad to hear from any doctor, clinic or manufacturer interested in birth control, in order that it may have the fullest sources of information possible.

All communications should be addressed to the Secretary, the National Birth Control Association, 26, Eccleston Street, London, S.W. 1.

MARRIAGE HYGIENE

We have now received two copies of a new quarterly publication, *Marriage Hygiene*.

The journal proposes to deal with subjects connected with eugenics, race welfare, social hygiene, contraception and marital adjustment.

The first numbers represent an international aspect of this subject and the contributors include such well-known writers as Marie Stopes, Havelock Ellis, C. P. Blacker, and scientists such as Julian Huxley and Cecil Vogt. The Indian point of view is well represented by Lieutenant-Colonel S. S. Sokhey and R. C. Rakshit.

There are articles on contraception, but the aims of the journal are much higher than the provision of 'sex literature' in its popular and worst sense. A few of the titles are 'Medical education in relation to sex', 'Indian outlook in sex relations', 'The problem of sterilization' and 'Eugenics in relation to health and disease'.

Each number contains abstracts of suitable articles taken from the medical journals of many countries, and also reviews.

The journal is edited by Dr. A. P. Pillay and is printed in Bombay. It compares very well in appearance with high-class quarterly journals published in Europe and America, and appears to be entirely free from the blemish of misprints that are so liable to disfigure medical publications in this country.

We congratulate the editor wholeheartedly on the high standard he has achieved in the first two numbers, and we wish the journal every success.

THE BRITISH JOURNAL OF TUBERCULOSIS

We have just received the first number of volume XXIX of this journal. Since the last number was issued there has been a change in both its editorship and its format. The present format is certainly a very satisfactory one, and, though we had never felt that there was very much room for improvement, we now see that a considerable improvement has in fact been effected. In the matter of clarity of type, quality of paper, and general layout the journal now compares favourably with any specialist medical journal published in England or America.

With the change of editorship there are to be certain changes in the policy of the journal; it is naturally difficult to pass any judgment on these from the perusal of a single number, but from the editorial note we gather that the object is to make the journal more practically useful to the general medical reader, by the inclusion in each number of clinical articles. This is an excellent principle, as specialist journals are liable to be devoted to the reports of abstruse investigations of specialist research workers, which investigations may be important, but often have no obvious practical application, and are only appreciated by the very few.

The present number contains a useful practical article by professor Lyle Cummins on the problem of acute pulmonary tuberculosis in young females, one on the tuberculin treatment of phthisis, a radiological paper on Assmann's focus, and several other valuable contributions. There is a short report of a clinical case—death following artificial pneumothorax refill—and a 'consultation'; both these are to be constant

features of the journal in future. The rest of the number is devoted to meetings of societies, abstracts, and reviews of books.

We hope that this journal will have a wide circulation in this country. Tuberculosis in India admittedly has special features of its own, but it is sometimes forgotten that it has far more features in common with tuberculosis in other countries than special ones.

The new editor is Dr. L. S. T. Burrell, M.A., M.D., M.R.C.P.

JOURNAL OF THE RAJSHAHI DISTRICT BOARD MEDICAL ASSOCIATION

This association has decided to publish its own journal. The editor details the circumstances that have lead to this decision, and expresses the ideals of this new venture in the first number of this journal, which we have just received, thus:—

'No organized effort has ever been made to improve the scientific and professional knowledge of the medical officers and compounders of the district boards in Bengal. To the medical officers and compounders of the province have been entrusted the health of rural Bengal and these medical officers represent the strongest section of the Licentiate now organized by their separate associations. While efforts have been made towards the improvement of the status of the whole body of the Licentiate these efforts have hardly been directed specially towards improving the lot of the poor medical officers of the district boards in Bengal and actually no effort has been made for the compounders of the district boards. These officers really serve the masses and carry the banner of the humanitarian services of the board in the interior of the province under most difficult circumstances, and in every case a district board is popular or unpopular according to the services rendered by its medical department. Yet these officers have to remain satisfied with a meagre provision. They are cut off from the outside world of moving and progressive civilization; they have to remain content without the amenities of town life. Their secluded life in the villages begets in them a natural indifference rendering their lot what it is to-day now. Toiling hard the whole day long, busy with their daily routine work, they have little time to think of other things of life, even of how to improve their destitute condition.

We require to strive hard to change the inferiority complex that has taken root in them. We require also to discuss in our humble way the modern advancement of medical science; we should create an atmosphere of thinking high while we live plain.

We are aware that there are a number of scientific journals of high standard in the country. We hold out no apology to compete with these organs.

We require our own organ which by continuous efforts in future will be able to help our members to become more useful to the people they serve in every way possible. We require also a means to ventilate our grievances, to give expression of our feelings through its columns and we require to hold high up to our members that personal considerations should always be sacrificed everywhere at the bugle call of duty and in the services of humanity—so that we can keep the banner of our noble profession high aloft even in times of the greatest adversity'.

The district board medical officers are often considered to be the cinderellas of the medical profession in India, but we think that the use of expressions such as 'destitute condition' is perhaps drawing a little too gloomy a picture of their lot. However, if by means of their journal they are able to improve their position in any way, we certainly wish it a long and prosperous life. We congratulate this association on their enterprise.

THE DARBHANGA RESEARCH SCHOLARSHIP, 1935

THE following is an abridgement of a notice, dated 30th January, received by us on 13th March under a covering letter dated 13th February, from B. B. Dutt, Officiating Controller of Examinations, Calcutta University, Senate House, Calcutta, from whom further details can be ascertained and to whom applications should be made :—

Applications are invited from candidates for the 'Darbhanga Research Scholarship' for the year 1935.

The scholarship will be awarded for the purpose of encouraging original research in medicine in its various branches, and all graduates and licentiates in medicine of the Calcutta University are eligible to compete for the same. The value of the scholarship is Rs. 50 a month tenable for one year only from July 1935 to June 1936.

The scholar will be required to devote at least four hours a day, Sundays and holidays excepted, during the tenure of his scholarship to research work in any special branch of medical science to be previously selected by him and approved by the Board of Studies in Medicine.

The applications from intending candidates must reach the office of the Controller of Examinations not later than the 30th April, 1935.

Current Topics

Collosol Iodine in the Treatment of the Pneumonias

By R. V. MURPHY

(From the *Irish Journal of Medical Science*, October 1934, Sixth Series, No. 106, p. 563)

THIS treatment was introduced in a preliminary note in the *Irish Journal of Medical Science* (July 1929). Thirty cases, of which three were fatal, were then briefly described. It was shown how beginning with the 0.2 per cent solution of collosol iodine I had the 0.4 per cent and later the 0.8 per cent solutions prepared. I gradually worked my way up to the last, which is now the only one I employ. In the present series sixty further cases, of which six were fatal, will be considered. There is a total therefore of ninety cases treated, with nine fatalities. Though the number is small the preponderance of successes during a period of two and a half years, endorsed as it is to a great extent by the experience of my colleagues, justifies, I believe, some broad conclusions which will be suggested in the course of this article.

I do not intend to enter into the question of the general treatment or nursing of pneumonia. In what follows it must be clearly understood that I confine myself solely to the consideration of the intravenous treatment.

We are told that the total amount of iodine in the blood is not more than 2 mg. of which only a portion is active. Ten cubic centimetres of C.I.N.S. (collosol iodine new solution 0.8 per cent) contain 80 mg. of iodine. It would appear, therefore, that the iodine delivered in this form directly into the blood stream replenishes a failing reserve and is immediately available. Certainly in actual practice collosol iodine has proved itself to be a detoxifying agent of great range and potency—presumably where a shortage of iodine is responsible or mainly responsible for the breakdown of the mechanism of immunity. In the strength and dosage here employed the preparation is apparently free from danger of any kind.

I have been asked the questions :

(1) How often and for how long should the injections be given ? and

(2) Are there any contra-indications ?

With regard to the first question there is only one danger, so far as I am aware—that of giving up the

treatment too soon. Every case of pneumonia or of suspected pneumonia admitted under my care is given a dose of C. I. N. S. (10 e.c.m.) immediately on admission. Several thousands of injections have been given by me or under my personal supervision for a variety of conditions as well as the pneumonias and I have never met a single contra-indication. The only reaction of any kind which I have seen was a local sclerosis on a few rare occasions, and the treatment was then carried on in another vein. Sclerosis is not a contra-indication for the continuance of the treatment and does not usually recur in the site of the new puncture. I have found the treatment very satisfactory in phlebitic and thrombo-embolic conditions: periphlebitis, thrombophlebitis and phlegmasia alba dolens. Results were not less remarkable than those obtained in the pneumonias.

The cases of pneumonia and broncho-pneumonia so far encountered include every clinical variety: primary, secondary and post-operative, simple and complicated, and embrace also every bacteriological group, pneumococcus types I, II, III and IV, as well as streptococcus and Friedländer's pneumobacillus.

The treatment is still young and apart from individual factors which may modify the response in individual cases there may be external influences, epidemical, geographical and racial, the effects of which practical experience alone can decide. I shall here deal only with the former.

Most of the cases under the treatment reached the stage of crisis within three days or less, others reacted slowly, but even when recovery was delayed to a late and protracted lysis, as a rule an early mitigation of the toxæmia was a definite and welcome phenomenon. Many of the cases found in hospital, coming as they often do on the third or fourth day of the disease, or even later, from unhygienic and otherwise unsuitable environment, often arrive so ill that their removal to hospital has been an added risk. In most of these, precedent lack of health has rendered them unsuitable to face the demands made on their powers of resistance and endurance by such a severe and critical illness as pneumonia.

The straight case of uncomplicated pneumonia in which the defensive mechanism has not been overwhelmed is expected to yield to treatment in about 24 to 48 hours. A slow or poor response in what appears to be an uncomplicated case which is putting up a good fight should, I think, be taken as evidence of the presence of some hidden tuberculous or other infection which has flared into activity.

Uncomplicated post-operative pneumonia appears to be very amenable; this is easy to understand when it is remembered that the patient has been specially prepared for treatment, already in bed and under general management, on a very light diet, with the bowels well opened; the setting is ideal for the treatment, which is administered early. In the emergency operation all these details may be altered with a consequent modification of response.

Cases in private practice respond more rapidly than most hospital cases and those coming under the treatment early generally do much better than those who come under it late.

Recurrence as a rule responds very well. In the present series three patients developed recurrence whilst actually undergoing the treatment; one ended fatally. In the other two, crisis of the recurrence was completed within 24 hours.

Sputum examination was possible in only 21 cases. Of these 14 were found to belong to one or other of the pneumococcal groups. Much further investigation will be required before the exact position in this respect will be known. Of the cases in which complete examination of the sputum was possible :

- | | | |
|---|-------------------|--------------------------|
| 2 | were pneumococcus | type I. |
| 2 | " | type II. |
| 3 | " | type III (1 fatal case). |
| 7 | " | type IV. |

In 3 cases Friedländer's pneumobacillus,
 „ 3 cases streptococcus, and
 „ 1 case pneumococcus type I and tubercle bacillus
 were the predominating organisms.

I use collosol iodine frequently as a prophylactic agent. In the four cases described I think it may be inferred that other complications as well as pneumonia were successfully warded off.

In the influenza epidemic of the early months of the year 1933, I used the preparation largely in the early stages of the disease to prevent complications and sequelae, as I had found it was as suitable for influenzal pneumonia as for primary pneumonia. It did not appear to have any beneficial effect on the influenza itself, which was, therefore, treated by other means.

In consequence of the results of the treatment of thrombophlebitis and phlegmasia alba dolens I have been tempted to use the preparation with the aim of preventing post-operative thrombus and embolus. For some time I have held the view that where sepsis is not evident a dormant or quiescent pre-operative distant sepsis, awakened into occult activity in a pre-disposed subject, may frequently prove one of the predominant causative factors in this condition, and owing partly to the poor reaction of the patient and partly to the low-grade virulence of the infection known signs of infection do not present themselves and in consequence the disease develops undetected. It is possible that the thrombosis is immediately of toxic origin arising from sepsis, even though the field of operation and its neighbourhood may be all that the surgeon may desire, and it is now my rule to administer C. I. N. S. to the debilitated subject with low blood pressure and sluggish circulation before and for a long time after operation unless the integrity of the teeth, maxillary antra, respiratory tract, gall bladder, etc., has been proved to be above suspicion. While this view is awaiting final confirmation or disproof I console myself with the reflection that there does not appear to be any alternative treatment, until a vessel has actually become blocked by thrombus or embolus, when the patient may have to depend for his life on a desperate emergency operation or, should a smaller vessel be involved, on palliative treatment which may in some cases be contributory to recovery.

The Bed-bug as a Housing Problem

By A. W. McKENNY HUGHES, D.I.C., F.R.E.S.

(From the *Medical Officer*, Vol. LII, 17th November, 1934, p. 203)

CONSIDERATION of the bed-bug as a housing problem must be subdivided under two heads: (1) precautionary measures to be taken with regard to new housing schemes, and (2) the disinfection of old buildings, many of them in private ownership, which, while structurally sound, are bug-infested and must be disinfested whilst the tenants remain in occupation. The latter is, to my mind, by far the bigger and more difficult problem to tackle.

Let me now deal with the first part of the problem. Prevention of infestation of new houses is in no way difficult, though some people may say that it is impracticable on the grounds of expense. Tenants' furniture should be fumigated in transit to the new house with hydrocyanic acid gas in one of its forms, or alternatively all furniture should be fumigated in the new house within a week of arrival. This latter method necessitates a clearing house, where people whose houses are being fumigated can spend the night; the institution of such a house would, I think, be of great advantage in any bed-bug campaign. As far as possible, families should be encouraged to buy their second-hand furniture before their move, so that

it can be fumigated with the rest; but if not, I should like to see a by-law passed with regard to its sale, since a large percentage of reinfestation is due to this class of dissemination.

Let us now consider the design of new houses. In the first place, woodwork should be reduced to the minimum. Skirtings may be replaced by cement rendering down to the floor; door frames can either be of metal or wood, and the place of the architrave and mouldings taken by adhesive tape, placed over the crack, which is bound to develop, and painted over. Pipes should be carried clear of the wall, and where they pass through the floor or ceiling, precautions must be taken to prevent access to the crevice so formed, or they should be thoroughly chased in. Picture rails should be replaced by pin hooks or by metal slots incorporated in the plaster which, although they provide harbourage for bugs, can nevertheless either have paraffin poured into them, or be cleaned out by a piece of wood exactly fitting the slot.

Hot-water systems should be as near the bath-room as possible, to avoid unnecessary piping, and all such fixtures and fittings should be incorporated in such a way as to give the minimum of harbourage. A little imagination and common sense will do a great deal in this direction. Particular thought should be given to the foundations, to ensure that there shall be no subsidence of the structure; a few more shillings here may save pounds later on. Floors, walls and ceilings should be of such materials as to provide the minimum of cracking or harbourage; thus, beaver boards overlaid with tongued-and-grooved flooring should be avoided, or bugs will harbour between the two. Certain forms of sound-deadening materials, too, are admirable harbourage for bugs. In short, the bug likes warm, undisturbed cracks and crevices to live in, where it can get either its back and belly against some rough surface or where it can put its shoulder to the wall; therefore, avoid as far as possible providing comfort and even luxury for this pestilential creature.

Now let us consider the second and more difficult part, namely, the disinfection of houses structurally sound in which the tenants will have to remain. Hydrocyanic acid gas will undoubtedly clear such premises of bugs, but the houses must be vacated for twenty-four hours, and those on either side for about seven and a half hours. This necessitates finding alternative accommodation for the tenants. It may be possible to develop some system whereby the whole operation may be safely undertaken in a day, but that is not practical politics as yet. To my mind it is no good doing one or two houses in the middle of a heavily-infested terrace, as the bugs are certain to return from either side. If disinfection is to be done, it must be done thoroughly or not at all; skimpy jobs bring the whole campaign into disrepute. As to cost, while this is undoubtedly high, you have got to consider this in relation to other methods not so effective which have to be done over and over again and which are, when all is said and done, only palliatives. Also there is the far more serious aspect that by leaving this reservoir of bugs, you always have a ready source from which these insects may be taken to new areas. The best method then that we know of so far is the use of hydrocyanic acid gas, systematically applied. In the hands of experts it can be used with safety, but in the hands of untrained only partially trained workers it is extremely dangerous and fatal accidents are likely to occur. Tenants can be fumigated as a whole or a few houses can be taken at a time; but what I would emphasize is that no fumigant leaves any deterrent to bugs behind, and therefore terraces should be treated up to the natural break, such as a passage or street, and not stopped in the middle. Another fumigant, very much as effective as HCN and so toxic to man, is ethylene oxide (Ethylene-oxide-carbon-dioxide). Unfortunately,

somewhat more inflammable and explosive than HCN, but again, experts can handle it safely. In cost it is relatively the same as HCN, but it can not be used effectively at low temperatures. It has the advantage that it can be used without having to empty the houses on each side; the process takes roughly twenty-four hours. Then we come to that old favourite, sulphur, which when used at a rate of six pounds per thousand cubic feet twice at an interval of three weeks will be about 85 per cent effective and no more. The various processes are so well known that I need not describe them to-day. Finally, there are various sprays which give off a vapour, such as those with basis of orthodichlor-benzene or other chlorinated hydro-carbons. Orthodichlor-benzene used by itself is only about 50 per cent effective, and possibly not quite as much, but the mixtures of fifty-fifty orthodichlor-benzene-carbon-tetrachloride or fifty-fifty orthodichlor-benzene-methylated-spirit seem promising. All these sprays that I have mentioned necessitate the use of a gas mask when applying them, and carbon tetrachloride has at various times been known to cause liver trouble in those handling it, so that special care is necessary. One disadvantage of all these mixtures is the smell left behind by the orthodichlor-benzene, which will persist for very nearly a week, though it is quite harmless. Carbon-tetrachloride and some of the other chlorinated hydro-carbons also act sometimes as paint solvents. Research is being carried out with regard to these mixtures, and we shall hope to know more about them before very long. At present they have only been used more or less haphazard in houses and tenements and not under scientific control, so that there are no exact data available with regard to concentration, toxicity, and so on, but these experiments have indicated that this would appear to be a profitable line to follow.

A great deal has been heard about reconditioning new houses, and in many cases this has been done without taking into consideration the elimination of bugs. In so doing it seems to me that good money has been thrown down the drain, and the houses thus reconditioned still remain slums. In all cases where this class of work is about to be undertaken, the houses should be fumigated with HCN before any reconditioning takes place and, naturally, the same proviso with regard to the fumigation of one house in the middle of a bug-infested terrace holds good here.

Another aspect which deserves consideration is the disposal of material from bug-infested houses demolished under clearance orders. There is no doubt that the woodwork from such houses is liable to be an important factor in the dissemination of the bed-bug, not only as firewood, but in various other ways. It is possible that the brick and plaster work may also be a source of danger, though the evidence here is conflicting. In any event, precautions should be taken before this material is disposed of to a contractor. This can be done either by fumigating the houses before they are pulled down or, less satisfactorily, by means of the blow-lamp, which obviously cannot be entirely relied upon.

Any large-scale fumigation scheme must have running concurrently with it a cleanliness campaign, since, as there is no deterrent effect left by the fumigant, houses will sooner or later become reinfested unless measures of cleanliness are taken to avoid this. All forms of publicity should be used to make the population 'bug-minded', so that the presence of the insect is not considered as a social stigma and something to be hidden, but as a misfortune from which any of us may suffer, and which all of us have got to help to alleviate. With this end in view, publicity by the press, by means of circulars from local authorities, by special stalls at health weeks and by lectures and films, should play its part. The more the bug is talked about the easier will be the task of those who are responsible for its eradication.

Intensive Liver Extract Therapy of Sprue

By C. P. RHOADS, M.D.

and

D. K. MILLER, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. 103, 11th August, 1934, p. 387)

THE effective treatment of sprue is a problem of considerable practical importance in spite of the fact that therapeutic methods which are occasionally successful have been at hand for many years. One serious difficulty lies in the fact that different individuals, presenting an apparently identical clinical picture, manifest wide variations in the amount of specific therapy that they require to effect clinical cure. Moreover, the available information regarding the treatment of sprue is confusing, since the various therapeutic procedures in use appear to be so unrelated and the clinical results obtained from them have been so inconstant that it has seemed impossible to draw up a general rule of treatment that would be applicable to all cases.

More detailed analysis of the existing therapeutic methods in the light of present knowledge makes it clear that a general rule of treatment can be formulated and, furthermore, that from the therapeutic results an understanding of the etiologic mechanism of the disease syndrome may be obtained. Such an understanding is of importance in treatment, since without it various therapeutic procedures seem to be purely empirical; and when doubt as to the rationale of a procedure exists the determination to carry it through to the desired end is frequently wanting.

Prior to 1927 the treatment of sprue was almost entirely dietary. The accepted policy was to restrict the intake of fat and of carbohydrate and to depend on different single and apparently dissimilar food materials as the principal sources of nutrition. Thus in turn liver diets, meat diets, milk diets, banana diets and strawberry diets were all recommended and were frequently effective when employed early in the course of the disease. Complete and permanent cure occasionally followed such treatment but early and severe exacerbations were the rule and a stage of the disease was eventually attained at which dietary measures were ineffective.

Baumgartner showed that the feeding of these diets was specific in promoting hæmatopoiesis. He applied to sprue anæmia a procedure devised by Minot and his associates for evaluating the effectiveness of specific therapy in pernicious anæmia. The method was based on the fact that the percentage of reticulocytes in the circulating blood increased very markedly at the onset of a true remission. Reticulocyte rises were induced by feeding to individuals with sprue anæmia certain diets which were known to be effective in the treatment of that disease but which did not contain liver or other material known to be curative in pernicious anæmia. This observation was evidence that some constituent of the diet was specifically required for hæmatopoiesis in sprue anæmia and that this dietary constituent was not the liver function so effective in the treatment of pernicious anæmia. This difference in the response to therapy was the more incomprehensible when the striking hæmatologic similarities between the two anæmias were considered. Two problems were then at hand; first, to ascertain the presence of some common factor in the diets known to be effective in the cure of sprue and, second, to show the relationship of such a common factor to the substance effective in pernicious anæmia, a disease that is symptomatically and hæmatologically similar to sprue.

A more detailed knowledge of nutrition makes it clear that the seemingly dissimilar diets do possess one factor in common: a relatively high content of water-soluble vitamin. Since this appears to be the only common factor, it seems probable that the effects obtained in the treatment of sprue by feeding these diets are due to the water-soluble vitamin which they

contain. It is an established principle in the study of nutritional factors that, if a demonstrable physiologic effect can be induced by feeding any one of a variety of substances in which only one particular vitamin is common to all, the effect will occur only in the presence of a deficiency of that vitamin in the body of the test animal. Since several different diets are irregularly effective in the treatment of sprue and these diets contain only the water-soluble vitamin as a common factor, it seems probable that a lack of that vitamin exists in certain cases of the disease. Furthermore, the existence of such a lack suggests that it is perhaps causal; that is, that sprue is a disease due in some instances at least to a deficiency of some fraction of the water-soluble vitamin complex. Since dietary treatment is not always effective, however, it follows that in other instances one or more additional or complicating etiologic factors are involved. Studies of the factors concerned in the etiology of pernicious anemia, a disease similar in many respects to sprue, have given the clue to the nature of the complicating factors concerned in the etiology of the latter disease.

In 1925 Minot and Murphy showed that whole liver was specifically effective in the cure of pernicious anemia. Bloomfield and Wyckoff fed whole liver to individuals suffering from sprue and in 1927 published an account of clinical cures resulting from such treatment. In the following year West reported remissions following the treatment of sprue with that fraction of liver which had been shown by Cohn, Minot and their associates to be effective in pernicious anemia. Liver extract then, as well as diets rich in the water-soluble vitamin, may be therapeutically effective in sprue. To establish the etiologic similarity between sprue and pernicious anemia, it remained only to prove that the water-soluble vitamin could induce remissions in the latter condition. Such an effect was suggested by the studies of Castle and his associates, which showed that a dietary constituent contained in beef muscle was acted on by a substance present in normal gastric juice to produce a third substance potent in producing remissions in pernicious anemia. The gastric juice of patients with the disease was not effective in forming the hæmatopoietic principle by interaction with the dietary factor. Hence, a deficiency in the gastric secretion was clearly causative of pernicious anemia. Other investigators showed that the livers of patients with pernicious anemia who lacked adequate gastric secretion were devoid of the hæmatopoietic principle present in normal livers. It was apparent that the product of the interaction of a dietary factor and normal gastric secretion was stored in the liver, where it was available for clinical use as liver extract.

It appeared from these investigations that a dietary constituent as well as normal gastric secretion was required for hæmatopoiesis. In 1931 Castle and his associates pointed out that a disease similar to pernicious anemia should develop if there was an insufficient intake of the dietary constituent, a defect of the gastric juice or defective absorption of the product of the interaction of these factors. Sprue was similar to pernicious anemia and was due in some instances to lack of a diet rich in the water-soluble vitamin. Clearly, if the dietary factor involved in the causative mechanism of pernicious anemia should be shown to be the water-soluble vitamin, the link between pernicious anemia and sprue would be established.

The next step was to establish the dietary factor as being related to the water-soluble vitamin. Wills described remissions induced in cases of tropical macrocytic anemia by feeding an extract of yeast, which was rich in that vitamin. Castle and Rhoads observed similar responses resulting from the use of the same yeast extract in cases of sprue. This was confirmatory evidence that a relatively simple preparation rich in vitamin-B complex was effective in that disease. An exactly similar effect was shown by Strauss and Castle to occur if the same yeast extract

was incubated with gastric juice and fed to patients with pernicious anemia. Reticulocyte rises and improvement of blood values occurred uniformly. Neither the yeast extract nor the gastric juice was effective alone. This indicates that the dietary factor, given as meat in the original experiments of Castle, was contained in a yeast extract rich in the water-soluble vitamin and that an interaction with gastric juice was required for it to be effective in hæmatopoiesis in pernicious anemia. Thus the only difference between certain cases of sprue and of pernicious anemia was that a substance rich in the water-soluble vitamin was therapeutically effective *per se* at least in certain cases of sprue, whereas it was effective in pernicious anemia only after it had been incubated with normal gastric juice. The dietary factor in the two conditions was the same. Simple dietary lack, while apparently causative in certain instances, was clearly not the only factor involved in the production of all cases of sprue.

Since symptomatic similarities between sprue and pernicious anemia exist, and since orally administered liver extract, a material effective in pernicious anemia, was occasionally effective in cases of sprue, which had failed to respond to diet alone, it seemed probable that the lack of a gastric secretory factor might contribute at least to the causative mechanism of sprue in the way in which it had been shown to be causative in pernicious anemia. The observation by Rhoads and Castle of the similarity between the pathologic alterations of the bone marrow in the two conditions is further evidence that they possess some etiologic factor in common. The study by Castle and Rhoads of a large number of cases of sprue in Puerto Rico showed that the gastric dysfunction obtaining in pernicious anemia did play a part in the production of symptoms in certain instances. This was clear from the fact that in some cases the addition of normal gastric juice to substances rich in the water-soluble accessory food factor was required before a remission could be effected. This was evidence that there was a lack of anti-pernicious-anemia factor in the gastric juice of the patients tested. In the same publication it was reported that in other instances remissions could not be induced even though both the dietary factor and the gastric factor were supplied to the intestinal tract. This was also the case when liver extract, a material supposed to represent the product of the interaction of those two factors, was given by mouth, although when a much smaller amount of liver extract was administered parenterally, maximum responses were obtained. As suggested by Castle, for pernicious anemia this fact can indicate only that the effective material either was not absorbed from the intestinal tract or was broken down in it. The former hypothesis was considered to be the most probable, since sprue may result from surgical intervention with the absorbing surface of the bowel; moreover, sprue is frequently associated with secondary deficiencies of such dietary constituents as calcium and iron, elements not likely to be destroyed in the intestinal tract.

It appears, then, that clinical sprue may arise in three ways; by dietary lack, by lack of the gastric enzyme that is absent in pernicious anemia, or by inability to absorb the product of the interaction of the first two. Clearly, any one of the three factors may be causative or any combination of the three may exist. Furthermore, differences in the relative importance of the part played by each of the three might account for variations in the clinical manifestations.

In view of the facts presented, it becomes clear that the desideratum in the treatment of sprue is to place the product of the interaction of the dietary factor and the gastric enzyme, that is, liver extract, as near to the site of utilization as possible in as large amounts as may be required. Our purpose in this communication is to indicate what parenteral route is most

effective and what amounts of material are required to induce remissions in the most refractory cases. If methods effective in those cases were to be applied as a general rule in the treatment of all, therapeutics would become simplified and the period of the patient's incapacity would be materially reduced.

Comment

The four cases of sprue reported [case reports omitted] all failed to respond to some form of specific treatment but did finally improve under intensive parenteral therapy. They were the only ones in a series of twelve cases of sprue similarly studied and treated in which a clear-cut comparison between different methods of treatment could be drawn. In all four refractory cases a steady, progressive increase in the severity of the disease had taken place in spite of supposedly adequate therapy employing agents that were known to be specifically effective. When moribund, all were finally treated with massive doses of liver extract, parenterally administered, and in all a prompt, dramatic and complete remission was effected. All have been maintained in good health by means of injections of liver extract at intervals not exceeding one month.

In addition to being completely refractory to any sort of oral therapy, two of the individuals had received persistent and supposedly adequate parenteral treatment without improvement. It thus appears that a well-defined threshold requirement for liver extract exists in certain cases of sprue, a threshold that must be exceeded before a remission can be established. When such a refractory case is encountered intravenous therapy is indicated, not only because it is more effective in raising the concentration of the required substance in the blood stream but also because it is the only route by which the required amount of material can be administered without causing serious discomfort and perhaps disability to the patient. Any patient with sprue admitted for treatment now receives intravenously an amount of liver extract derived from 50 grammes of liver each day until a clear-cut remission has been established.

The liver extract preparation found to be most effective is a relatively simple, unconcentrated product. Evidence is at hand that a certain loss of activity results from too great refinement and concentration. Patients with sprue have failed to improve on intramuscular injection of a large amount of a highly refined and concentrated product although a full remission has been effected by the use of a much smaller amount of material more simply prepared.

The mechanism of the production of the increase in the threshold requirement for liver extract is at present unknown. An analogous situation may be observed in animals, however, in experimentally-induced disease states due to the lack of certain accessory food factors. One of these experimental deficiencies is 'canine black tongue', a condition considered by Goldberger and Wheeler similar to pellagra in human beings and due to a lack of the heat-stable, water-stable vitamin. In black tongue a refractory state may be induced if treatment is kept at the minimum required for preservation of life during repeated acute attacks. Eventually no amount of material rich in water-soluble vitamin will effect improvement, although a minute amount of the same substance is prophylactically effective.

The amount of treatment required to maintain a person with a high threshold requirement in good health, once a full remission has occurred, varies widely in different individuals. In one instance intramuscularly administered liver extract is required at intervals of two weeks. If the treatment is delayed, gastro-intestinal symptoms recur and persist until liver extract is administered. In other individuals, treatment once in thirty days is sufficient to prevent recurrence.

As previously discussed, the effectiveness of liver extract in the treatment of sprue, coupled with other

known facts, clarifies the etiologic mechanism of the disease. The efficacy of intensive treatment of cases refractory to less adequate measures is further evidence of the specificity of the effect of liver extract. The requirement of certain individuals for very large amounts of effective material administered parenterally is evidence of a threshold requirement that must be exceeded before a physiologic response can occur.

The emphasis that has been placed on the purely hematologic responses of pernicious anemia to liver has obscured the fact that corresponding improvement of the lingual and gastro-intestinal symptoms occurs. This was pointed out by Minot and Murphy in their original communications and has been commented on by others. The idea of treatment by diet of a gastro-intestinal disorder, such as sprue, is so thoroughly ingrained in the medical consciousness that it is difficult for it to abandon the conception of some beneficial quality of the diet, simply as a regimen. The foregoing discussion should serve to indicate that the occasional effectiveness of diet in the treatment of sprue is largely based on its ability to supply the water-soluble vitamin. Diet is, at best, an uncertain method of obtaining 'liver extract' for the internal economy of the organism. By the use of parenteral liver extract the obstacles of dietary defect, gastric dysfunction and intestinal malabsorption are at once effectively surmounted.

Summary and conclusions

1. Four out of a series of twelve cases of sprue were refractory to ordinary effective treatment. Clinical cure followed intensive parenteral liver extract therapy.
2. The use of liver extract in sprue is indicated by the etiologic mechanism of the disease.
3. Sprue frequently requires much more intensive treatment with liver extract than does pernicious anemia.
4. The frequent parenteral administration of large amounts of liver extract is the therapeutic procedure of choice in sprue and should be continued until a remission is established.

The Treatment of Gonorrhœa in the Female

By EMILY DUNNING BARRINGER, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. 103, 15th December, 1934, p. 1825)

The successful treatment of gonorrhœa depends largely on a thorough understanding of the underlying pathologic condition and on making a careful diagnosis before any type of treatment is instituted. The diagnosis should be established by a positive finding of the gonococcus by smear, culture or complement-fixation test.

Gonorrhœa in the female can be likened in many ways to a typhoid infection. Taken as an acute infection in a woman or girl who has previously had normal pelvic organs, one may expect a fairly definite clinical course in an ascending infection, which passes up above the internal os. Thus it will run its course for a period of six to seven weeks, reach its clinical peak and then begin to subside, so that at the end of twelve to fourteen weeks one may look for a cessation of the clinical symptoms and the organs may return to approximately their original conditions and be free from the gonococci. This is barring complications. But gonorrhœa similar to typhoid is prone to complications.

Another factor to be considered is whether the gonococcus is the only offending organism or whether other pyogenic organisms are present which give rise to a so-called mixed infection. It is this admixture of other organisms which is usually found in the complications and especially the prolongation of the complications. Still another factor to be considered is the resistance of the patient, and it is the careful understanding and evaluation of all these various

considerations that underlie intelligent treatment of gonorrhœa in the female.

Gonorrhœal cases clinically fall into three groups, acute, subacute and chronic, and the treatment will vary with these different stages.

Thus in the acute stage the main indications are for absolute rest, lack of trauma and treatment directed toward preventing the spread of the infection. Ill-advised douching and medication of the cervix in very acute cases may result in just the outcome one is trying to prevent. It is debatable whether, in these very acute cases, rest in bed, with carefully ordered general medical supervision, and only local cleansing of the external genitalia do not lead to recovery as satisfactorily without local treatment.

However, it is my routine procedure in acute cases in which it is obvious that the infection is ascending to give the patient, in addition to absolute rest and lack of trauma, mild heat in the form of medicated douches under low pressure and the administration of a solution of mild silver protein by gentle application to the cervix and urethra. The greater degree of heat, 130°F. as given by the Elliott machine, seems unwise during the acute stage because of the softening and relaxation of the cervix, thereby opening up one of the natural barriers to the spread of infection.

In the subacute stage the complications are usually found as possible gonorrhœal infection of the rectum; thus it is not uncommon to have Bartholin or Skene's glands and ducts involved. These in turn will often subside spontaneously in the course of the routine treatment of the infected urethra, and it is better in my judgment not to attempt any local treatment of these glands until expectant treatment has failed. It is in this stage that greater degrees of heat may help, and this may be given by the medicated douche up to 116 to 118 degrees or with the Elliott machine, whereby the heat may be pushed up to 130 degrees.

With the chronic stage it is important to try to estimate what organisms are responsible for the continued symptoms. Occasionally symptoms continue because of a persistent virulent infection by the gonococcus. It is much more likely, however, that the gonococcus has passed out of the picture and that the symptoms are resulting from infection with the streptococcus or actinomyces. If the chronic symptoms are due to the gonococcus, especially perimetritis, continued heat therapy, such as prolonged hot douching, Elliott-machine treatment, or diathermy, will undoubtedly be effective. If the streptococcus or actinomyces is the offender, probably little will be accomplished.

It is in this stage that one is confronted with complications that have not yielded to expectant treatment and it becomes necessary to consider radical measures.

Thus, intractable Skene's glands should be irrigated with an antiseptic solution through a small malleable tipped needle made for this purpose. If this is not efficacious, the gland should be obliterated by the passage of an electric cautery needle down through the duct.

Periurethral abscess should be treated expectantly by careful massage, the abscess being emptied into the urethra and the sac filled with an irritant antiseptic solution. These should be opened surgically only when this expectant method has failed.

If Bartholin glands do not subside with expectant treatment, careful resection should be done, preferably by the intravaginal route, as described elsewhere.

Persistent lesions of the cervix may call for radical treatment. If there are chronic sluggish erosions, it is important to know by culture what organisms are responsible. If, as is often the case, actinomyces is responsible, iodine therapy should be given by mouth and locally.

Careful coagulation or cauterization by the electric needle is often indicated, and in selected cases the ionization of the cervix is valuable. But it is always

practical to stress again the importance of selecting these cases with greatest care, for an ill-advised operation on the cervix of a recent gonococcus patient may stir up a fulminating salpingitis.

Operative intervention on tubes and ovaries infected by the gonococcus should be done only for urgent or definite reasons and should be avoided whenever possible. Spreading gonococcal peritonitis is rare but may be fulminating in character, especially in young girls, in whom it may simulate a ruptured appendix and calls for prompt operation. The perimetritic exudate of the acute and subacute stages may become completely absorbed. The sealed off gonorrhœal pyosalpinx soon becomes sterile pus and may subside, and the possible functional return for these damaged organs is not yet fully appreciated.

Can the curative process be hastened and impending complications aborted? Will increase of the antibody formation, such as administration of vaccine accomplish this? There is considerable division of opinion in regard to the efficacy of vaccine therapy. A number of authors find little value in this form of therapy, while others approve its use. Demonchy advocates enormous doses of stock or autogenous vaccine and reports satisfactory results. He states that quite a number of cases are cured by a few injections without local treatment. However, the stage of the infection seems to make a difference, for in twenty-five cases of acute gonorrhœa in the male treated by the Demonchy vaccine, the results were not impressive, as the number of cases cured were small, the time required for cure was longer than the average and there was a tendency to stir up an arthritis, which is a fairly rare symptom.

CONCLUSIONS

1. Vaccine therapy is not a specific for the cure of gonorrhœa. It is, however, probably a very valuable form of treatment in the acute and subacute stages of the disease. This is probably true also in chronic cases in which the main offending organism is the gonococcus. It is probably not of value in cases due to 'mixed' infection.

2. In the acute and subacute stages, vaccine therapy will probably shorten the period of hospitalization. However, the great drawback of severe reaction from this treatment, especially with large doses, is to be considered.

3. It is questionable whether very large doses are justifiable, because of these reactions.

4. Probably vaccine therapy in smaller doses combined with indicated routine treatment would be a more desirable type of treatment.

5. Vaccine therapy is of sufficient importance to warrant further careful study into dosage, complement-fixation reaction, and tests for proof of cure.

A New View of Psoriasis

(From the *Lancet*, 15th September, 1934, p. 605)

A NOTABLE contribution towards the solution of the problem of psoriasis, perhaps the greatest and most elusive in the domain of dermatology, appears to have been made by Prof. O. Grütz, of Wuppertal-Elberfeld, in a lecture given to the Berliner medizinische Gesellschaft on June 6th last and published in the *Deutsche medizinische Wochenschrift*, 13th July, 1934, p. 1039. His hypothesis is based on the histological findings in a case of the disease in which diabetes with hyperlipidosis and hypercholesterinæmia were superadded. It was shown by special fat-staining methods that the lipid substances which had been excreted into the skin, with the production of characteristic xanthoma nodules, were present in great abundance in the parakeratotic scales which are the clinical sign manual of psoriasis. This was no new discovery, for excess of cholesterol and lipid substances had long since been recorded in psoriasis scales by Unna, Linser, and others. Its significance had, however, been ignored. Grütz reinvestigated the point, went a step further, and in collaboration with

a biochemical colleague Prof. Bürger, of Bonn, has now examined the lipoidal content of the blood of a large number of psoriatics. This had previously been done by Puley and Brill, but they appear to have contented themselves with only one or two examinations of each case and to have found no abnormality. A physician suspecting hyperglycæmia would hardly be satisfied with a single negative blood examination; the Grütz-Bürger series of blood examinations appear to have been conducted on the lines of those which are now in use in the diagnosis and management of cases of diabetes before a routine has been definitely established.

In brief outline the procedure consists in giving 5 g. of cholesterol in 100 g. olive oil to the fasting subject, and then withdrawing 50 c.cm. of blood at 4-, 8-, and 24-hourly intervals for examination of the variations in the fat and lipid of the untreated serum. The alteration in psoriatics as compared with the normal is said to have averaged a 40 per cent increase of total serum-fat content, together with a pronounced excess of cholesterol and phosphatide compounds. This figure is high enough to render recognition of the characteristic blood state a relatively simple matter, and should make correspondingly easy the task of the pathologists who will be investigating the justification of the claims put forward. If the results confirm Bürger's work we shall have to regard psoriasis as due to a disturbance in the metabolism of fats, and the pathogenesis of the disease will afford a close resemblance to that which now pertains for xanthoma. Right or wrong the hypothesis presents us with a key which appears to fit many of the subsidiary locks in the prison which has guarded the secret of psoriasis. On the side of its undoubted hereditary tendency it may be urged that just as diabetes—a carbohydrate dyscrasia—may be familial, so we may have a congenital inability to deal with the metabolism of fats. The effect of arsenic in psoriasis may be due to its influence on general metabolism, including that of fats—the excessive formation of which is sometimes stimulated by arsenical medication. No one would deny this possibility, for thyroid and other endocrine products have been generally

accepted as having a favourable influence on the course of the disease in many instances. The benefit of local treatment with tar, chrysarobin, cignolin, and a host of other substances can similarly be explained as a local chemical effect—possibly of oxidation type—on the lipoidal and other fatty substances present in the lesions, while the recurrences after local treatment on this basis require no explanation at all. Nor would it be surprising that the effect of sunlight, ultra-violet light, x-rays, and other physical methods should only be temporary.

The scheme of treatment suggested by Prof. Grütz is presented in a very simple table. Fats, oils, cream, butter, cheese, and margarine are banned, and it should be the doctor's aim to reduce fat intake, which cannot be altogether excluded, to a maximum of 20 g. in the adult and 10 g. in children per day. Yolk of egg, in view of its cholesterol content, should also be excluded, although the white is allowed. Such a diet should offer little difficulty even in domestic circles, and calorie requirements are amply covered by carbohydrate and protein intake. There appears to be little danger of serious loss of weight even after months of fat deprivation, and no mention is made of nutritional effects due to the loss of vitamin D. It is quite likely that just as in most cases of hyperglycæmia there is an individual threshold, it would be possible to ascertain the fat and cholesterol tolerance by trial and experiment for each patient suffering from psoriasis, so that he would not necessarily have to endure a completely fat-free diet for the rest of his life. It is evident, so far as the work has gone, that dietary treatment does not and is not expected to cure psoriasis. But if it renders latent the inherent dyscrasia in the metabolism of fats, a patient conforming to the principles laid down by his doctor might reasonably expect to remain immune from attack. The periods of remission, followed by recurrences, which have hitherto been the disheartening fate of victims of this disease will make it impossible to assess the value of this new form of treatment for some years; the case records of Prof. Grütz's series are not given in his lecture, but are promised for early publication.

Reviews

A PRACTICAL TREATISE ON DISEASES OF THE SKIN.—By Oliver S. Ormsby, M.D. Fourth Edition. 1935. (With revision of the Histopathology in this edition by C. W. Finnerud, B.S., M.D.). Henry Kimpton, London. Pp. xiii plus 1288. Illustrated with 619 engravings and 3 coloured plates. Price, 50s.

THIS book has nothing to recommend it in preference to other well-known textbooks on the subject.

It gives stereotyped descriptions of skin diseases arranged under the usual headings with copious references throughout the text to the opinions and advice of all the well-known authorities, but nowhere was it noticed that the author expressed any opinion of his own. In fact it gives the impression of being a compilation from numerous writers rather than the result of long and wide personal experience of the author in the study of dermatology with a judicious admixture of information from other sources such as a textbook usually consists of. It is considered unnecessary to give sketchy descriptions of the exanthemata because such diseases are always fully dealt with in textbooks of medicine.

In some instances the word *recent* is rather overworked; for example its use in describing the treatment of ulcerating granuloma of the pudenda with tartar emetic is distinctly misleading.

There are numerous illustrations from photographs some of which are of educational value, but others such as the one on p. 625, depicting chondrodermatitis nodularis chronica helioides, would be of little assistance in making a diagnosis, and the provision of only three coloured plates in a book of this size and price is rather niggardly.

It is a book that might be of use to the general practitioner for reference.

P. A. M.

MEDICAL RESEARCH COUNCIL. (Special Report Series, No. 195.) Active Immunization against Diphtheria. Its Effect on the Distribution of Antitoxin Immunity and Case and Carrier Infection.—By Sheldon F. Dudley, Percival M. May and Joseph A. O'Flynn, with a note by J. Orr Ewing. 1934. Published by His Majesty's Stationery Office, London. Pp. 140. Price, 3s.

'ELEVEN years ago the Council published a report of an investigation made at Greenwich Hospital School by Surgeon-Commander Sheldon F. Dudley, R.N., on "The Schick Test, Diphtheria and Scarlet Fever". Since that time the work has been continued, so that the present report and its predecessor together form a unique record of twelve years' continuous study of diphtheria, especially in its immunological aspect, among a semi-isolated community where practically

all factors such as social class, nutrition, occupation, and environment have remained constant.

The acceptance by the school authorities of inoculation against diphtheria in 1928 introduced a variable which afforded an opportunity for further research in that it allowed a close comparison of natural immunity, acquired by a community in which diphtheria was endemic, with a condition of immunity artificially induced by inoculation. That this opportunity for a properly controlled investigation was fully utilized is tested by the present report.

It is the introduction of this variable which, for instance, allows the authors to make the deduction that three doses of diphtheria toxoid can produce in three months as high an immunity as three years' residence in a community where diphtheria is endemic. The natural process was of course accompanied by a high incidence of diphtheria, whereas in the artificial immunizing process no clinically recognizable diphtheria developed. Thus, not only was there a great saving of time in producing the degree of immunity, but also a marked improvement in the general health.

It is an impressive fact that as the result of this experience the authors can claim that artificial immunization, at least in a community where sources of the infection are constantly present, is an almost certain protection against recognizable clinical diphtheria. On the other hand, the demonstration that active immunization by inoculation is no protection against diphtheria-carrier infection, and may under certain conditions increase the number of virulent carriers, shows the limitations of this method of protection against diphtheria when it is only partially carried out in a community.

Either in its purely academic aspect as a biological study of the interactions of the environment and two species of organism—man and the diphtheria bacterium—on each other, or as a practical study of immunity against a deadly disease, the present publication can be regarded as a notable contribution to knowledge.

We feel that we cannot do better by way of explaining the scope of this book than to give the above quotation from the preface. Diphtheria is often very troublesome in schools in the hills in India, and we recommend this special report to those who have to deal with the problem.

DEFINITE DIAGNOSIS IN GENERAL PRACTICE.—

By W. L. Kitchens, M.D. 1934. W. B. Saunders Company, Philadelphia and London. Pp. xlv plus 1000. Price, 45s.

It is very hard to accept this book as a serious contribution to medical science, and yet reading Dr. Musser's introduction one must concede that, if the book is used as it is meant to be used, it must make for more accurate examination of the patient and therefore must tend towards the betterment of the science of diagnosis, and not towards its reduction to the status of a jig-saw puzzle, as one is rather inclined to think when one first takes up this book.

As the arrangement of the book is, in our experience, quite unique we should perhaps describe it. It is divided into two parts—symptoms and diseases. There are 513 symptoms or diagnostic signs, to each of which a page is devoted; on this page is a full list of diseases with which this sign or symptom is associated. Conversely, in the second half of the book there are 407 diseases on 407 separate pages and on each page there is a list of the symptoms, signs, and clinical laboratory findings associated with the particular disease. To ensure quick cross reference all diseases, symptoms, signs, etc., are given numbers corresponding to the pages on which they are dealt with. Take an example; you find that a patient has a tricuspid murmur; you look up 'murmur, tricuspid' in the symptom index and are referred to p. 323, where you find a list of thirteen diseases in which a tricuspid murmur may occur; you then turn to the second part

of the book and look up these thirteen diseases in turn to see which fits in with the other symptoms and signs you have observed in your patient. Or if you really wish to reduce it to the jig-saw puzzle level, you write down the numbers of the diseases you find on p. 323; you take one by one the other signs and symptoms you have observed, write down the numbers you find on their pages, select the number that recurs most often, look up the corresponding disease, and there you are!

Yet, used intelligently, the book presents great possibilities.

ELECTROCARDIOGRAPHY.—By Chauncey C. Maher, B.S., M.D. 1934. Baillière, Tindall and Cox, London. Pp. xlv plus 250, with 95 illustrations. Price, 18s.

IN spite of the numerous books on electrocardiography that have recently appeared dealing with the clinical aspects, the author feels that there is still 'need for a treatise on electrocardiography for use by the general practitioner, the medical student, and the specialist exclusive of the cardiologist'. The value of electrocardiographic examinations in the diagnosis of the heart diseases has recently been much appreciated and a detailed knowledge of the modern conception of the cardiovascular disease is absolutely essential. It may safely be said that this book makes as good a presentation as can be done in a volume of this size.

The first few chapters deal with the clinical concepts of the heart diseases and explain the cause of the normal electrocardiographic deflections and their relation to physical and physiologic processes in the heart. The author then proceeds logically to an analysis of the abnormal cardiac disturbances and their effect on the electrocardiograms. The whole problem is presented in an interesting fashion and the methods for the scientific evaluation and arrival at a diagnosis are systematic. The syndrome of symptoms, prognosis and treatment have been accurately described. Some suggestions on the routine interpretation of electrocardiograms are very desirable and the author has attempted to outline a scheme at the end of the book.

It is a simple, concise and yet a comprehensive treatise by an author who can lay claim to a very large experience. It is accurately written and sufficiently illustrated, though it may not be quite as useful to the beginners as some of the other elaborately detailed works. Throughout the book the orderly arrangement is a great aid to the reader, and physicians will find in the volume a most satisfactory and valuable diagnostic help.

R. N. C.

A HANDBOOK OF GYNÆCOLOGY.—By B. Solomons, B.A., M.D. (Univ. Dub.), F.R.C.P.I., F.C.O.G., M.R.I.A. Third Edition. 1934. Baillière, Tindall and Cox, London. Pp. xlv plus 368, with 250 illustrations. Price, 15s.

THE third edition of this well-known book on gynæcology is welcome, and will be appreciated by both students and practitioners.

The author has a clear and forceful style. He is dogmatic in his opinions and illustrates them excellently. It is a pleasure to see illustrations clearly indicating the meaning of the text and eliminating redundant explanations.

It would be fair to describe the handbook as 'compressed gynæcology' strongly flavoured with the author's opinions. It is more welcome for this as a student will be left in no doubt whatsoever as to what type of treatment or operation is required; dogmatic statements are always welcome, and are particularly valuable when backed by such experience as the author's.

The chapter on x-rays and radium treatment deserves special commendation. It contains a clear explanation of the methods adopted at various clinics and makes a difficult subject easy of understanding.

Containing a wealth of information in compressed yet readable form, the book will be of value to students studying for examinations, and to practitioners as a book of reference.

S. N. H.

THE TREATMENT OF COMMON FEMALE AILMENTS.—By F. John McCann, M.D. (Edin.), F.R.C.S. (Eng.), F.C.O.G., M.R.C.P. (Lond.). Third Edition. 1934. Edward Arnold and Company, London. Pp. viii plus 379. Price, 12s. 6d.

TEXTBOOKS deal with typical cases; unfortunately all cases are not typical, but vary considerably. The newly-qualified practitioner finds a great difference between the cases he was taught on and those he encounters in practice. The author has bridged the gap and written a book based on cases and experiences from his own practice. No references are made to other writers; the book is the result of the author's own observations and treatment.

The major part of the book is devoted to gynaecological complaints. Particularly instructive are the chapters on gastro-intestinal complications of female ailments, and their prevention. Prescriptions are plentiful and will be of value to the practitioner, but throughout the book special stress is laid on the value of prevention.

There is much that is controversial in the book, an example being non-interference in severe puerperal infection of the uterus. This does not however detract from the value of the book, as a whole.

The book should prove of great value to practitioners interested in female ailments and will be read with advantage by specialists.

S. N. H.

THE RHEUMATIC DISEASES. A CONCISE MANUAL FOR THE PRACTITIONER.—By G. D. Kersley, M.A., M.D. (Cantab.), M.R.C.P. (Lond.). 1934. William Heinemann (Medical Books), Limited, London. Pp. xiii plus 88. Illustrated. Price, 6s.

THE part played by rheumatic diseases in causing loss of work and inefficiency is very important. So much has been written during recent years about this vast subject, that it is very difficult for the busy practitioner, whose time is limited, to keep pace with the literature. Dr. Kersley's book therefore is very welcome. The writer in his introduction says that he has endeavoured to include the maximum of useful and up-to-date information in the very minimum of space, and in this he has certainly succeeded. In the compass of less than a hundred pages he has described the clinical features of typical examples of the various forms of diseased conditions met with in this group. A sufficient account of the pathology has been given to enable the reader to appreciate what is taking place in the tissues of the patients, and the treatment has been discussed in detail. Various chapters of the book deal with rheumatic fever, rheumatoid arthritis, fibrositis (including lumbago, sciatica, brachial neuritis, etc.), osteo-arthritis, climacteric arthritis, spondylitis and gout. The chapter dealing with physiotherapy is very interesting and explains how the various treatments are to be carried out.

The book is very practical, is written in a lucid and concise manner and will be a very useful addition to the practitioners' series. The importance of the subject of arthritis is being appreciated in this country and this book will help to draw the attention of senior students and practitioners to the recent work on this subject.

R. N. C.

INTERNATIONAL CLINICS. Volumes I and II, Forty-fourth Series, 1934.—Edited by Louis Hamman, M.D. J. B. Lippincott Company, Philadelphia and London. Pp. iv plus 320 in volumes I and VIII plus 317 in volume II. Illustrated. Price, 50s. per set of four volumes. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 37-8

THE two volumes of *International Clinics* received contain clinical lectures and original articles dealing with the ætiology, pathology, diagnosis and treatment of important medical, surgical and obstetrical diseases together with the others pertaining to special and sub-branches of the subjects. The articles are all contributions from authorities on the various subjects dealt with and are lucid and well written. The information given is important and up to date; the bibliography at the end of the articles is very valuable and will be useful to the reader. Besides discourses on the many commoner diseases that are met with in everyday practice, the volumes also give résumés of recent advances in special branches of medicine, pediatrics, surgery and obstetrics. A few diseases dealt with in these volumes deserve special mention inasmuch as the information contained is of great practical value. Examples of these are hepatic insufficiency, the management of old age conditions and the sections on recent progress in medicine and surgery in volume I; the pathogenesis of anterior poliomyelitis, operative shock, collapse therapy in the treatment of pulmonary tuberculosis, the medical and surgical aspects of peptic ulcer and the sections on the recent progress in obstetrics and pediatrics in volume II. The volumes are well got up and contain excellent plates in addition to many ink sketches, and we strongly recommend them to the practitioner in this country.

R. N. C.

MELANCHOLIA IN EVERYDAY PRACTICE. CLINICAL TYPES, DIAGNOSIS, TREATMENT.—By Edwin L. Hopewell-Ash, M.D. (Lond.). 1934. John Bale, Sons and Danielsson Limited, London. Pp. 136. Price, 7s. 6d.

IN this small book the author has described some of the important clinical types of psychosis, usually classed as melancholias, and of manic-depressive psychosis, which are frequently encountered by general practitioners but not properly recognized. The first eight chapters deal with various clinical types of melancholia, their differential diagnosis from schizophrenia, paranoia, paranoid psychosis, etc. The book is full of comparative tables, charts and clinical histories to illustrate various phases of these ailments. It is written in simple and plain English and will serve as a refresher to students going up for examination and to young practitioners.

R. N. C.

MURRELL'S WHAT TO DO IN CASES OF POISONING. (Fourteenth Edition). By P. Hamill, M.D., D.Sc., F.R.C.P. 1934. H. K. Lewis and Company Limited, London. Pp. viii plus 208. Price, 5s.

THE book was first published in 1881 and the fact that this is the fourteenth edition is sufficient proof of the popularity and success of this volume dealing with the treatment of minor emergencies in everyday practice. The book opens with the definition of a poison and the classification of this group of drugs. The author then proceeds with the differential diagnosis of cases and instructions to the general practitioner as to how to send the specimens from cases of poisoning for examination to the chemical examiner for medico-legal purposes. The portions dealing with the requisites of an 'antidote case' which he considers should be in possession of every practitioner are a valuable addition in this volume. The wise advice regarding the charging of proper fees in these cases is interesting and should be noted by practitioners. The

main body of the book deals in a lucid and concise manner with the individual poisons, mode of their ingestion, their fatal doses and indications for treatment. As cases of poisoning are exceedingly common in general practice, the reviewer can confidently recommend this volume to advanced students and practitioners for ready reference.

R. N. C.

A TEXTBOOK OF HISTOLOGY: FUNCTIONAL SIGNIFICANCE OF CELLS AND INTERCELLULAR SUBSTANCES.—By C. V. Cowdry. 1934. Henry Kimpton, London. Pp. 503. Illustrated. Price, 25s.

THERE are now many books on histology available to the student and the justification for yet another one seemed to the reviewer to be very doubtful, but a natural antipathy to a new-comer was at first mitigated when he read the name of the author and then rapidly overcome—not by a formal apologia in the preface, but by the book itself.

The author points out that in books of histology there is a tendency to supply a large number of illustrations of histological structures that the student will see for himself in actual sections, whereas the main object of the illustrations should be to make him understand the meaning of what he sees; that is to say, the book should not attempt to replace the practical class by giving photographs of all the sections that the student is likely to see, but should supplement the teaching of these classes by explaining what he does not and cannot see in sections. Another feature of the book is that it introduces a little more physiology than does the usual histology textbook; this helps the student to look upon the cell, not simply as a cell with a certain characteristic structure, rather as a single unit with a special function but dependent on its surroundings and only acting as an integral part of a greater whole with the rest of the cells of the body.

The book is written quite definitely for the medical student and for this reason we looked forward to finding dogmatic statements regarding certain controversial points, e.g., on the origin of the monocyte, as suitable subjects for criticism, but we were out-manoeuvred, as the author gave a very good account of the different theories but refused to commit himself. In fact he took a somewhat cynical view of the controversy into which the unitarian, dualist, and trialist have entered 'with the fervour of a missionary campaign', and which he suggests has led, as has the bacteriophage controversy in this country, to threats of legal action. In the sections on blood formation, the blood cells and blood destruction all recent work has been taken into account and he gives a very fair presentation of the subject. His chapter on the spleen is a short one, but in it he gives a clear account of the structure and functions of this organ, as far as our present knowledge goes; his description of the spleen as 'a great blood filter and the headquarters of the reticulo-endothelial system' is perhaps not an entirely comprehensive one, but as complete a description as one can hope to give in a single line, and is worth remembering.

A list of references is included; this will be useful to more readers than the undergraduate student. We imagine that some of his remarks, e.g., 'whose paper should be read by every medical student', will tend to alarm the average student, who probably thinks that if he masters the contents of the textbook he will have done about as much as can be expected of him, as far as satisfying his examiners is concerned, but some have higher ideals.

The quality of the paper, print and binding are of a very high order, and there are a large number of very excellent coloured plates. It is a book that we can strongly recommend to both the student and his teachers.

L. E. N.

MATERIA MEDICA FOR NURSES.—By A. Muir Crawford, M.D., F.R.F.P.S.G. Third Edition. 1934. H. K. Lewis and Company, Limited, London. Pp. viii plus 100. Price, 3s. 6d.

IN preparing this edition, every care is taken to bring the book up to date. The principal changes in the new edition are in the chapters dealing with the commonly used drugs and the interpretation of the prescriptions. The book is concise and clearly written and supplies all the information regarding the elements of materia medica and pharmacology of drugs that are necessary for the nurse to know. We have no doubt that the present edition will maintain the popularity which the preceding editions have enjoyed.

R. N. C.

MATERIA MEDICA FOR NURSES.—By L. Oakes, S.R.N., D.N., and Arnold Bennett, M.P.S. 1934. E. and S. Livingstone, Edinburgh. Pp. viii plus 339. Available from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 3-12

IN preparing this edition every care has been taken to bring the book up to date, and several new drugs have been added from the *British Pharmaceutical Codex*. The book presents in a lucid and concise manner the essential details of composition and dosage of the common official and non-official drugs and preparations, together with short notes on their pharmacological action. The arrangement is clear and methodical and the doses are given in both the English and the metric systems. The chapter on poisons and antidotes, and the appendix containing examples of methods of calculating doses and percentage solutions are very helpful. In fact, this small book presents a short summary of the elements of materia medica and includes sufficient material to enable the nurse to acquire knowledge of the subject in accordance with the requirements of the General Nursing Council. It will be very helpful to the members of the nursing profession, not only for examination purposes but also as a handy book of reference. The printing and finish of the book maintain the publishers' high standard.

R. N. C.

ANÆSTHESIA AND ANALGESIA IN LABOUR.—By K. G. Lloyds-Williams, M.D., B.S. (Lond.). 1934. Edward Arnold and Company, London. Pp. 96. Illustrated. Price, 5s.

THE author has carefully dealt with the matter in a very easy and impressive style. The subject is discussed under various headings according to the different methods of analgesia used in different stages of normal and abnormal labours: 'Twilight sleep' (morphine-hyoscine narcosis) has been described in detail. The initial dose is morphine $\frac{1}{4}$ grain and hyoscine $\frac{1}{150}$ grain; the hyoscine is repeated at hourly intervals in doses of $\frac{1}{450}$ grain. Complete loss of memory indicates full narcosis. Gwathmey's quinine-oil-ether method is much in vogue in New York; a $\frac{1}{4}$ grain of morphine is given hypodermically with an intramuscular injection of 2 c.cm. of 50 per cent magnesium sulphate which prolongs and increases its effect very appreciably. This is supplemented by a rectal injection of a mixture containing:—

Quinine	..	20 grains
Alcohol	..	40 minims
Ether	..	2½ ounces
Olive oil	..	4 ounces

The result aimed at is analgesia, not anæsthesia.

In the second stage, gas and oxygen is the anæsthetic of choice, where this is available. A usual mixture is 80 per cent nitrous oxide and 20 per cent oxygen.

For Cæsarean section, spinal anæsthesia has been recommended as the best; percaine (1:1500 in 0.5 per cent saline) is the drug advocated. Headache is less likely to occur if a fine needle is used. In severe cases, 6 ounces of magnesium sulphate, given four-hourly

as an enema, is of service. Intravenous glucose or 2 c.cm. of 50 per cent magnesium sulphate intramuscularly is said to give relief. Vomiting is partially dependent on the fall of blood pressure: ephedrine 1½ grains or pituitrin 1 c.cm. is indicated. No excessive fluid should be taken; solids or semi-solids may be given.

For toxæmia cases, sedative drugs, e.g., potassium bromide, chloral hydrate and opium, may be given in the early stages. Rectal administration of ether or paraldehyde is not contra-indicated. In the second stage, gas and oxygen should be given with ether. For cardiac diseases, chloroform should be avoided in failure of compensation. In pulmonary congestion, ether is to be avoided. Gas with increased quantity of oxygen is advocated; in the early stages, morphine ½ grain with atropine 1/100 grain is very good.

There are several illustrations of gas-and-oxygen apparatus, both for hospital and private use. It is really a valuable book with practical details and should be read by those interested in obstetrics and general anaesthesia.

P. K. M.

MAN AND WOMAN. A STUDY OF SECONDARY AND TERTIARY SEXUAL CHARACTERS.—By Havelock Ellis. Eighth Edition. Revised. 1934. William Heinemann (Medical Books) Limited, London. Pp. vii plus 469. Illustrated. Price, 10s. 6d.

THE great advances of recent years in biological knowledge have led the indefatigable writer of this book to revise and remould it for the seventh time, so as to bring it up to date and at the same time make it more suitable for the general reader.

The physiological, anatomical and psychological characters of the human race are taken *seriatim* and their differences in man and in woman fully considered. It is found from this survey that man excels in some respects and woman in others, so that through the gradual stages of evolution an almost perfect compensatory balance between the sexes has been established.

The book gives a carefully-reasoned discussion on the subject of the capability of women to replace men fully in modern life, and while the author shows that the partial emancipation of women from home duties has been of benefit, her entire freedom from care of the home and rearing of children is biologically unsound and cannot be successful in the long run, and it is wrong to look on this inability of women completely to replace men in industrial and business life as evidence of inferiority.

It is a book that all thinking persons might read with advantage and should be carefully studied by the extremists of both sides who claim either absolute equality of the sexes or absolute superiority of one sex over the other, for to this class it will convey a lesson of moderation and a realization that the undoubted differences between man and woman are not indications of the superiority or inferiority of either, but are truly complementary to each other, and are differences which have gradually evolved throughout the ages, are necessary for the continued progress of the human race, and cannot be upset at a moment's notice.

P. A. M.

A PRACTICAL BOOK ON BIRTH CONTROL.—By K. V. Mathew. Third Edition. 1934. Published by Mrs. A. Mathew, Travancore, S. India. Pp. 254. Illustrated. Price, Rs. 2-4

DR. MATHEW's small book 'Birth Control' adds yet another to the long list of so-called practical books on birth control methods. There are nowadays so many good and cheap books on the subject in English that one feels the author's energy and time would have been better spent in preparing a vernacular

edition. His intention is to bring birth control within the reach of a 'few of the neediest of his fellow beings' and English is hardly the medium of choice for such a purpose. However, a third edition of the book has been called for since June 1933, and it is therefore meeting a demand.

Dr. Mathew is writing for the layman, consequently a discussion of the methods of procuring abortion seems rather out of place. The same applies to much of the anatomical detail of the external sex organs. It is quite unnecessary for a sound understanding of the mechanism of the methods described and could be omitted without detriment.

The get-up of the book is poor, the English lacks style, and the proof reading has been very badly done. On the other hand the latest methods of conception control, even those still in the early experimental stage, are mentioned.

J. M. O.

RADIOLOGICAL TERMINOLOGY.—By C. E. Gaitskell, M.R.C.S., L.R.C.P. (Lond.). 1935. J. and A. Churchill Limited, London. Pp. 90. Price, 5s.

IT is a continual matter of regret to us that no English publisher brings out a purely English medical dictionary. American medical dictionaries abound and these have gone a long way to meet the needs in this direction of Great Britain and her colonies, for the best amongst these American dictionaries are Anglicized, or semi-Anglicized; that is to say, if you look up 'haemorrhage' you will find half a column of words commencing with the syllable *ham*, but for the rest you are politely requested to 'see *hem*'; there you will find 17 columns of words spelt with an *e* where English writers would use the diphthong *æ*. The result is that you cannot 'trust' American medical dictionaries, and you may sometimes be lured into using an Americanized spelling, or if you are a die-hard, of going to the other extreme and using a pedantic one.

The book under review has the special virtue of being completely English. It however deals only with one special subject, as its title suggests. Nor is it strictly a dictionary, though it serves the functions of one within its limited scope. It will be a useful guide to the practitioner who finds it difficult to read diagrams and quite as often impossible to understand and appreciate the full significance of the radiologist's report. It should also prove useful to students, nurses, and apprentice technicians in radiographical departments.

ILLUSTRATIONS OF REGIONAL ANATOMY.—By E. B. Jamieson, M.D. Sections I to V. Section I:—Central Nervous System. (Contains 48 plates.) Section II:—Head and Neck. (Contains 61 plates.) Section III:—Abdomen. (Contains 37 plates.) Section IV:—Pelvis. (Contains 30 plates) and Section V:—Thorax. (Contains 27 plates.) 1934. E. and S. Livingstone, Edinburgh. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price—Complete set, Rs. 22-8; Separately:—Sections 1, Rs. 5-4; II, Rs. 7-8; III, Rs. 4-2; IV, Rs. 2-10; V, Rs. 3

WE do not feel that we are rating these books too high when we say that they are what anatomy students of a number of generations have been waiting for. Dr. E. B. Jamieson is a lecturer in anatomy and he knows how popular good drawings are amongst his students. Illustrations, however good, cannot completely displace the written or spoken word in the teaching of anatomy, but they can go a very long way towards doing this, and without good illustrations the lecturer will soon find himself addressing a gathering of cross-word-puzzle players. Dr. Jamieson has therefore decided to issue these illustrations in the form of loose-leaf books, so that his students may

carry away from his lectures more than a visual impression of his blackboard drawings; the loose-leaf form was chosen so that each illustration can be detached from its cover and pasted into the student's note-book.

The illustrations are coloured, and in our opinion quite adequately coloured, though the author states that in the originals from which they were prepared colour was used more freely. We cannot help feeling that the colouring of anatomical diagrams can be overdone; in no case has the lack of colour in these illustrations detracted from their clarity. Each section is very complete and we have failed to think of any naked-eye anatomical structure that has not been illustrated at least once, and usually in all its aspects.

The plates, which number just over 200, are divided into five sections, the central nervous system, the head and neck, the abdomen, the pelvis, and the thorax; the illustrations referring to each region are bound in a separate loose-leaf binding. The method of holding the leaves together is the simplest and most effective that we have seen, and we are surprised that this system is not adopted more frequently.

These illustrations should prove extremely useful to the teacher of anatomy in India, as well as to the student; they are very suitable for use in the epidiascope, or, where one is not available, to pin on to the blackboard as an aid to memory while a larger drawing is being made. The price is very moderate and many students will be able to purchase copies for themselves, but in this country it is to the teacher of anatomy that they will appeal particularly.

THE HUMAN GYROSCOPE: A CONSIDERATION OF THE GYROSCOPIC ROTATION OF EARTH AS MECHANISM OF THE EVOLUTION OF TERRESTRIAL LIVING FORMS.—By A. Kenealy, L.R.C.P. (Dublin). 1934. John Bale, Sons and Danielsson, Limited, London. Pp. 313. Illustrated. Price, 12s. 6d.

In presenting the consideration that, as plastic clay on the rotating disc of a little potter's wheel of industry is shapen and moulded in varieties of symmetrical three-dimensional forms, increasingly uprising in the vertical, so upon the rotating surface of the great terrestrial potter's wheel of creative evolution, the plastic matter of terrestrial organisms has been shapen and moulded in the countless diversities of increasingly complex, structurally differentiated three-dimensional forms of living species, progressively uprising in the vertical in the terms of increasingly complex elevated posture—I have ventured to base my argument upon the gravitation of the great Newton, instead of on the later Einstein theory.

To any reader who wishes to follow this argument through three hundred pages of metaphysical discussion, we can recommend this book. Its format leaves nothing to be desired, the type is large and clear and there are a variety of illustrations of such diverse subjects as the potter at his wheel, the giraffe in the Zoo, and pine trees in their natural surroundings: the connecting link is provided in the text, which, if somewhat abstruse, is written in commendable English, so rare in books that it is usually our fate to read.

HEART DISEASE IN THE TROPICS.—By H. O. Gunewardene, M.B., B.S. (Lond.), D.M.R.E. (Cantab.). 1935. Published by Messrs. Butterworth and Company (India), Limited, Calcutta. Pp. x plus 101. Illustrated. Price, Rs. 5

The writer in his preface says that he does not intend to give a description of the various diseases of the heart met with in the tropics, as these are dealt with very comprehensively in the works of many well-known men. The intention of the author is to deal briefly with the influence of the tropics on the incidence, course and prognosis of heart diseases and the

modifications required in treatment on account of the climate. He emphasizes the deleterious effects of ankylostomiasis on the cardiovascular system and refers to the part played by such diseases as beri-beri, blackwater fever, cholera, heat-stroke, leprosy, malaria, plague, trypanosomiasis, typhus, yellow fever, and diabetes, and gives illustrative cases in many instances. Chapters are also devoted to high blood pressure and therapeutic considerations of cardiac tonic drugs. The author has referred to his own experience in dealing with such cases, but on the whole the book is of too elementary a character to be of much use to practitioners in this country.

R. N. C.

THE STUDENTS' POCKET PRESCRIBER AND GUIDE TO PRESCRIPTION WRITING.—By David M. Macdonald, M.D., D.P.H., F.R.C.P.E. Tenth Edition. 1934. E. and S. Livingstone, Edinburgh. Pp. 263. Available from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 2-4

This useful little 'prescriber' has now reached its tenth edition and fifteenth reprinting. The history of the publication tells a story of decreasing intervals between reprintings. A new edition, rather than a reprinting, was necessitated in this case by the publication of the new British Pharmacopœia. Opportunity has been taken to make other alterations and improvements, and to bring the 'prescriber' up to date.

The introduction contains most valuable advice in prescribing. 'The tendency to use abbreviated terms in prescribing is much to be deplored' is a piece of badly needed advice. If this practice is to be deplored in a prescription, it is certainly inexcusable on the printed page, and we see that throughout this book, except that the legitimate abbreviations 'tinct', 'ol' and 'ung' are used, the prescriptions are given in full. Another feature is that the equivalent metric dosages are given in each case; in this edition the abbreviation 'mil' has been substituted for 'c.c.'.

The author, with the help of his publishers, seems to have compressed most of the information that one finds in the larger compendia into this vest-pocket volume. We can thoroughly recommend it to practitioners and students alike.

THE NATURE OF DISEASE JOURNAL. Volume III.—By J. E. R. McDonagh, F.R.C.S. Published by Messrs. William Heinemann (Medical Books) Limited, London. Price, 10s. 6d.

As this book presented few of the characteristics that he had been in the habit of associating with the word 'journal', the reviewer looked the word up in the *Shorter Oxford English Dictionary*. Amongst a number of meanings he found 'a record of travel', 'a daily record of events or occurrences kept by any one for his own use', and much further down the column 'any periodical publication containing news in any particular sphere'. The use of the word in this case is thus justified.

The 'journal' is edited and apparently contributed in its entirety by Mr. J. E. R. McDonagh, F.R.C.S. This editor-contributor has very unusual ideas on the origin and nature of disease, and anything that he writes, one may be certain, will be stimulating. The contributions in this publication are no exception.

The reviewer found it difficult to grasp the exact significance of his theories and he finds it quite impossible to convey these to others in the few words that are permitted in a review. Perhaps the quotation of the first few lines of the 'editorial' will help:—

'From the work the author has done to date, and the assistance he has been able to derive from the discoveries made by the modern astronomers, it has become possible, by arguing from the particular to

the general, to throw some light upon the origin and nature of disease. The work upon the blood in health and disease, and the action of drugs upon the protein particles in the plasma, support the view that the universe in an early stage in its career was a limitless elongated oval homogeneously filled with some primitive material'.

For the rest, the subjects on which he has written, are rheumatism, diseases of women, 'infection from within', and 'infections from without'. Chronic intestinal intoxication appears to be the author's long suit; this is the root-cause of all ills and specific micro-organismal infections are only secondary.

He states that the common cold and influenza can in every case be aborted by the use of 'anepidem', a preparation made at the Nature of Disease Institute, Limited. If this claim can be established, Mr. McDonagh is certainly a world-benefactor.

The 'journal' is published in the form of an attractive book with good cloth binding. The contents will be found very stimulating.

OTHER BOOKS RECEIVED

Tuberculosis: Its Treatment by Home Sanatorium Methods. By G. C. Chatterjee, M.B., Rai Bahadur, 1934. Published by the Central Co-operative Anti-malaria Society, Limited, 1-2A, Premchand Baral Street, Calcutta, pp. 51, illustrated. Price Re. 1.

Emanations: Their History and Their Future. By Zero. Blavatsky Press, Hyderabad, Sind, India, pp. 37. Price As. 4.

Injection Treatment in General Practice. By M. L. Gujral, M.B. (Punjab), M.R.C.P. (Lond.). 1934. Publishers: 'Practical Medicine', Nai Sarak, Delhi, pp. v plus 209 with 14 illustrations. Price Rs. 6.

Abstracts from Reports

HONG KONG MEDICAL AND SANITARY REPORT FOR THE YEAR 1933 BY A. R. WELLINGTON, DIRECTOR OF MEDICAL AND SANITARY SERVICES

In the absence of some system of registration of sickness the only sources of information available are the death returns, the returns of notifiable diseases, and the figures furnished by the Government hospitals and the western clinics of the Chinese hospitals. The number of deaths recorded indicates very correctly the deaths which have taken place in the colony but the figures regarding general diseases are only a fraction of the whole and too much importance should not be placed on deductions made from them. Though the educated Chinese appreciate the value of Western medicine the bulk of the population still pin their faith to the old-fashioned Chinese decoctions and, when ill, seek advice from one or other of the many empiricists or herbalists who practise in the colony. A number of those who enter the Government hospitals do so only after they have made full trial of Chinese medicines and when their disease is well advanced.

Year by year, however, the value of Western medicine becomes more and more appreciated. Proof of this is the ever-increasing number who attend the outpatient departments of Government hospitals or seek admission to the wards. Another proof is the success of the infant welfare clinic which was opened in Wanchai on 25th April, 1932, and which has become so popular that there is need of further accommodation.

Judging from the death returns the health of the colony was better than that of the previous year. The crude death rate was 22.38 per mille as compared with 25.02, the rate for 1932.

Malaria

This disease which in the early days of the colony was the great cause of death and from which Hong Kong derived its reputation of unhealthiness has now practically disappeared from the populous centres of Victoria and Kowloon as the result of the destruction of the breeding places of the carriers through efficient drainage. There is still some malaria in the outskirts of the two towns and a considerable amount in the rural areas of both the island and the mainland.

Investigations have proved that swamps, ponds and other collections of water in the open plains are more or less harmless and that the real danger lies within mosquito flight distance of the foot of hills and of valleys where collections of spring water in pockets, pools, swamps and streams form the breeding places of *Anopheles maculatus*, *Anopheles minimus* and *Anopheles jeyporiensis*.

Why it is so we do not know, but spring water which has not lost its sparkle does have an attraction for these three species. As a rule such water has a faint acid reaction due to dissolved carbonic acid gas. When it loses this and becomes flat it ceases to attract.

For many years the chief vector in the colony and new territories was believed to be *A. maculatus*. The researches of Dr. Jackson have proved this to be incorrect. *A. maculatus* is a carrier but is of far less importance in the spread of malaria than *A. minimus* and *A. jeyporiensis*.

It appears that species of mosquitoes, like races of men, can under different conditions of climate and surroundings develop differences in habits and tastes for food. *A. maculatus* in Malaya readily takes human blood and is a very potent agent in the spread of malaria. In Hong Kong, where it is very prevalent, it seems to prefer animals to humans and its importance as a vector of paludism is much less pronounced.

Though paddy swamps on the open plains are factors of little importance in the spread of malaria the same cannot be said of the irrigated terraces which form the rice fields of the hilly country. These have been shown by the Malaria Bureau to be, under certain conditions, prolific breeding places for that powerful carrier *A. jeyporiensis*. The irrigation ditches leading to and from the rice fields harbour both *A. jeyporiensis* and *A. minimus*.

Here as in Malaya disturbances of the soil often result in the formation of small collections of water which for reasons unknown attract the malaria mosquito and in which they deposit their eggs. The breaking of the soil is not a direct cause of malaria but a predisposing factor in a chain of events which favour the spread of the disease.

The most malarious areas are, therefore, those in or near the hills. Unless carefully watched and carefully controlled, works in the vicinity of the hills which involve disturbance of the soil such as roads, railways, or waterworks are nearly always attended by high sickness and death among the labour forces employed. In Malaya this was especially the case when the soil was of granite formation and the same applies in Hong Kong.

The total number of deaths attributed to malaria was 414, giving a death rate of 0.50 per mille for the colony. The lowness of the rate is, of course, due to the fact that the great majority of the population living in the drained urban areas are outside the zone of flight of malaria-carrying anophelines and, therefore, not subject to risks of attack.

Filariasis

Researches carried out by the malariologist show that a higher percentage of the people harbour micro-filaria in their blood than was formerly supposed.

Tuberculosis

Pulmonary tuberculosis ranks second to bronchopneumonia as the principal cause of death. The total number of deaths was 2,225, that for 1932 being 2,042. The death rate per mille was 2.71 as compared with 2.52 for the previous year. Pulmonary tuberculosis in the majority of cases is a disease which unfits the individual for the active exercise of employment months or even years before death supervenes. Because of the tendency of those unable to work and earn a living, to leave Hong Kong for their villages in China, the deaths reported form an incomplete index of the prevalence of the disease.

Leprosy

Though leprosy is a notifiable disease very few cases are notified. The number of lepers in the colony is not known but assuming that the incidence rate is the same as that of the neighbouring countries the total number cannot be less than 500 and it is probable that it is nearer 1,000. To many, these figures will appear to be exaggerations, nevertheless they are accepted by all who are authorities on the subject and have taken the trouble to make the necessary enquiries.

Plague

For the last four years no case of plague, human or rodent, has been reported in the colony. The disease has disappeared from Hong Kong and the same may be said of South China generally. The rat population is much the same as it was and so far as we know there is no change in quantity or quality in the flea population. The sanitary conditions in Hong Kong are generally better than they were but in the majority of Chinese towns there is little change. We must accept the fact that the rise and fall in plague figures have not been satisfactorily explained. We know that plague is primarily a disease of rats communicated to man through the rat flea, but we have to admit that we know little of the reason for the rise and fall in the incidence of disease among rodents.

Smallpox

Every year during the winter months this disease manifests itself in outbreaks which are sometimes epidemic and sometimes sporadic, to disappear with the advent of summer. During the year 566 cases were reported, of which 392 were notified through the medical officers in charge of mortuaries, that is after death had occurred. The total number of deaths was 433.

Cholera

No cases of cholera were reported during 1933.

REPORT ON THE PUBLIC HEALTH ADMINISTRATION OF BURMA FOR THE YEAR 1933. BY E. COTTER, MAJOR, I.M.S., OFFG. DIRECTOR OF PUBLIC HEALTH, BURMA

WHILE Burma records in 1933 the second lowest birth rate and the second lowest death rate, its infant mortality rate is at the other end of the scale and is exceeded only by the Punjab, the Central Provinces and Bengal.

In the rural areas the bulk of deaths are ascribed to fevers and 'all other causes'. It is not possible at present to obtain more accurate information of the causes of death, as in practically every case the diagnosis has to be made by a village headman, there being no medical practitioners in the village tracts. Undoubtedly, much of the fatal fever is to be ascribed to malaria. As for the large group of 'all other causes', it is impossible with our present statistics to attempt anything approaching an accurate analysis, but it is safe to say that infantile mortality constitutes a big proportion. In towns, the three leading

causes of death are respiratory diseases, infantile diseases and fevers. Of the fevers, 41 per cent are ascribed to malaria. The main proportion of the deaths due to 'all other causes' are ascribed to debility and anæmia, circulatory, urinary and digestive diseases.

The freedom of the province in the last four years from cholera and plague has been remarkable. Of these the change for the better is most marked in the case of cholera, which caused only 179 deaths in 1933 compared with an annual average for the last 20 years of 4,851. The 972 plague deaths in 1933 compare favourably with an annual average for the last 20 years of 4,826. Smallpox still prevails to an unsatisfactory extent and caused 1,506 deaths in 1933 compared to an average over the previous 20 years of 1,802.

Improvements in sanitation have been rendered very difficult in the last three years by the financial stringency which has paralysed the efforts of both Government and of local bodies; little has been possible in the way of improving such elementary services as water supplies and conservancy. It is true that up to now the general population has tolerated a very low standard of environmental sanitation without protest; but there are signs that this attitude is changing. Amongst the intelligentsia at any rate a growing sense of the importance of public health is apparent. The health education carried on in the schools for the last decade has not been without effect. Health lectures are becoming fashionable, and the high infantile mortality rate has caused an appreciable number of people to wonder and enquire what is wrong. An outbreak of epidemic disease is no longer regarded as an inevitable dispensation of providence.

In the increasing education on health problems lies one of the strongest weapons in the fight against preventable disease in Burma. It is from this class of people that the future local self-governing bodies will be largely drawn, and it is only when our municipal committees and rural councils are filled by those who recognize that one of their first duties is to guard the health of the people, that we are likely to get that much-needed improvement in environmental sanitation.

A word of praise is due to the provincial press which for the last few years has been generous in giving publicity to health matters, not alone by the publication of educative articles but in drawing attention to glaring instances of neglect on the part of local bodies to provide reasonable standards of sanitation.

In general it can be said that the public health in the province in 1933, when compared with previous years, was satisfactory. But there is a vast field for improvement. Much can be done without waiting for large sums of money to be made available. This is especially so in the case of infantile mortality, one of the root causes of which is ignorance on the part of the mothers.

Malaria.—Malaria continues to cause an extensive amount of sickness and mortality in certain of our rural areas. The expensive nature of permanent anti-mosquito measures, combined with the financial stringency, has made it impossible, except in a few places, to adopt anything more than palliative measures such as the issue of cinchona febrifuge tablets. In fact, the issue of cinchona febrifuge tablets has been the only practical step possible.

A serious outbreak, assuming epidemic proportions, occurred in Shwebo district in September in a group of villages 8 miles west of Shwebo town in the canal area. An investigation by the malariologist showed that the disease had been endemic in two villages before the infection spread. A special sub-assistant surgeon was placed on duty in the area, and an intensive distribution of cinchona febrifuge tablets was

carried out. Magwe district reported malaria outbreaks in Taungdwingyi and Myothit townships, where the malaria-carrying mosquitoes were reported to be breeding in the paddy cultivation. Special steps were taken here to revise the list of retail vendors of cinchona febrifuge tablets, and their number was increased with a view to making the tablets available in all these villages. Educative propaganda by distribution of pamphlets, magic lantern demonstrations and cinema shows was conducted to enlighten the people on the causation and prevention of the disease.

A spleen census taken in the Kengtung subdivision of the Southern Shan States showed that in some places the rates varied from 72 to 92 per cent. These rates give an idea of how intense malaria is in these areas.

Maternity work.—Maternity work in Burma is under the control of the medical department, and only when midwives are employed by child welfare societies does their work come within the scope of this report. There were 35 such midwives employed by 9 child welfare societies during the year; they conducted 5,682 confinements.

There are no trained *dais* in Burma. The training of *dais* or *wunswees* was attempted in 1929 and 1930 by the Society for the Promotion of Public Health, Maymyo, but, proving unsuccessful, was discontinued. Sub-section 2 of section 8 of the Burma Midwives and Nurses Act, which prohibits unqualified persons practising midwifery, has now been applied to the Maymyo municipal area and came into force in July 1933.

Child welfare work.—The growth of child welfare work in Burma is dependent on the supply of trained health visitors, and unfortunately the number of such workers available in the province at present is very small. The Burma branch of the Indian Red Cross Society has sent two candidates annually for health visitors' training to the Lady Reading Health School, Delhi, for the last five years, and, as a result, eight such health visitors are now employed in the province; but the demand and need for health visitors is far greater than can be supplied by sending girls as far as Delhi for training, and it is now recognized that a health school in Rangoon for the training of health visitors is an imperative and urgent necessity. For the last three years attempts have been made to organize such a school in Rangoon, but insurmountable difficulties led to its postponement. Things have now taken a turn for the better and the Central Maternity and Child Welfare Bureau of the Indian Red Cross Society has very generously promised a grant of Rs. 4,800 per annum for three years if such a school is started. The Burma branch of the Indian Red Cross Society, the Local Government and the Rangoon Corporation are co-operating, and it is confidently hoped that the school will be started in the early part of 1935. Not alone will such a school be able to provide us with an adequate number of health visitors, but it will also mean that the students are trained under conditions similar to those under which they will subsequently work. There should also be a larger selection of suitable candidates than is the case at present when it is necessary to go to Delhi for training.

School medical inspection.—The inspection scheme for the improvement of school hygiene and the systematic medical care of school children was introduced in 1922, and, each year after that up to the 31st March, 1932, a grant in aid was given by Government to each recognized Anglo-vernacular, English and normal school which adopted and worked the scheme. Each year an increasing number of reports were received from schools, showing that medical inspection was being gradually and effectively extended. In the year 1931 a total of 176 reports were received, and they gave a record of satisfactory work which must have had a beneficial effect on the health of the children.

In December 1931, with the collapse of the provincial finances and the need for urgent and stringent economy, Government decided to suspend the grant from April 1932. This step was regarded with misgiving by those concerned with the working of the scheme, but it was hoped that the suspension would be of short duration. This, unfortunately, has not proved to be the case and this is now the third year in which no financial help was given by Government for this very necessary work.

As was only to be expected, the number of annual reports of medical inspections received for 1932 showed a drop to 68, and the majority of those reports were from honorary medical officers, whose public spirit had induced them to carry on without pay the work in which they had been previously engaged. It would be unreasonable to expect this system of voluntary medical inspection to last, and for that reason the Director of Public Instruction in 1933, with Government's concurrence, proposed to the schools a scheme for making a four annas charge per mensem per pupil for medical attendance. Any hopes regarding this proposal of the Director of Public Instruction were dashed to the ground, by the almost unanimous opinion of the schools and inspectors that the parents, at the present time, cannot afford even four annas per mensem towards the cost of the medical care of their children.

To-day, therefore, the provision of medical inspection is left to the option of those Anglo-vernacular and English schools that find it possible either to provide the cost or that can still arrange for free medical inspection.

The most common defects noticed at the medical inspections were defective teeth 15.88 per cent, enlarged tonsils 11.17 per cent, defective vision 5.01 per cent, trachoma 3.93 per cent, anaemia 3.93 per cent and skin disease 3.03 per cent. A comparison of the percentages of defects in school children during 1933 with those of the previous five years reveals that there is a decreased incidence in most of the diseases. As, however, the schools which have been able to continue medical inspection are probably those with a bigger income and with a type of pupil drawn from the higher grades of society, the lesser incidence of preventable physical defects is to be expected.

It is encouraging to note that some of the school staff have taken a genuine interest in following up the recommendations of the medical officers.

ANNUAL REPORTS OF THE CHIEF ENGINEER, PUBLIC HEALTH DEPARTMENT, BENGAL, FOR THE YEARS 1932 AND 1933

As in the previous years the 24-Perganas District Board requested the department to arrange for the supply of filtered water at the annual Ganga Sagar Mela. A temporary water-supply plant, including a distribution system with cisterns on pedestals at suitable centres on the mela ground, was installed, and chlorinated water was supplied to the pilgrims. This temporary waterworks was very useful and prevented the spread of cholera and other water-borne diseases in endemic form.

In connection with the anti-malarial measures in the decadent areas of Bengal a scheme for contour survey of the area lying between the Hooghly and Damodar rivers in the districts of Hooghly, Howrah and Burdwan was sanctioned by Government, and arrangements were made to start the work.

The English Bazar water-supply scheme, the second scheme designed according to the 'decentralized storage' system, was completed during the year. Like the Asansol scheme, this is quite successful in checking waste of water without the assistance of meters. It is gratifying to see that local bodies are gradually

realizing the advantage of this system of water supply. In this connection the visit to Asansol of a deputation from the Sanitary Board, Bengal, may be mentioned. This took place on the 1st March, 1932, and the members of the deputation, besides examining the various sections of the waterworks, interviewed certain householders who have house-connections, and questioned them as to the suitability and convenience of the system. The general conclusion of the report of the deputation were as follows:—

'The committee were very favourably impressed with the system and consider that it meets successfully many of the most serious difficulties that have embarrassed water supplies in Bengal towns in the past, and that these advantages can be got without excessive cost either of installation or maintenance. They think it desirable that its advantages should be more widely known amongst municipalities generally'.

Correspondence

CURE OF FILARIASIS

To the Editor, THE INDIAN MEDICAL GAZETTE
 Sir,—A gentleman residing in the filarial district of Gonda and suffering from periodical attacks of filarial pain and swelling of the right hip was suddenly attacked with chyluria on the 31st July, 1933. He had had two courses of myosalvarsan for the lymphangitis. Still the attack of chyluria was of a pretty severe type; every time the urine was chyloric. Sometimes even coagulated lymph was thrown out in big lumps. Two injections of solu-salvarsan were given and later one full course of neostibosan (which caused a very severe general reaction); but the disease would not yield to any treatment.

After a duration of seven and a half months, and about six weeks after the stibosan treatment, the lymph in the urine suddenly began to diminish rapidly. On the 18th March, 1934, and on the third day it disappeared altogether. This happened along with an attack of the old lymphangitis and sciatica of the right side which passed off in two weeks. The gentleman has had no filarial symptoms since then.

I am very puzzled over this case; was the cure effected through the natural thrombosis of the lymphatics or what?—Yours, etc.,

M. ASLAM OMAR, L.M.P. (Agra).

GONDA.

[Note.—Filarial lymphangitis and chyluria recur at varying intervals. Cure in chyluria is believed to be due to the formation of a thrombus which blocks the rupture in the lymphatic vessel and brings about relief of symptoms. It would be interesting in this case to get full particulars of the number of attacks of lymphangitis he has had with the intervals between them, and to watch the patient some time longer.—EDITOR, I.M.G.]

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL H. E. MURRAY is confirmed in the post of Surgeon Superintendent, Presidency General Hospital, Calcutta, with effect from the 1st December, 1933, *vice* Lieutenant-Colonel A. H. Proctor.

Lieutenant-Colonel D. H. Rai, M.C., Professor of Pharmacology and Therapeutics, King Edward Medical College, Lahore, is appointed to officiate as Inspector-General of Civil Hospitals, Punjab, *vice* Colonel Reinhold, granted leave.

Lieutenant-Colonel K. G. Gharpurey is appointed, on his return from leave on 13th March, 1935, to be Civil Surgeon, Ahmednagar.

Lieutenant-Colonel J. M. R. Hennessey, Civil Surgeon, Jubbulpore, is appointed to officiate as Inspector-General of Civil Hospitals, Central Provinces, with effect from the 9th May, 1935, *vice* Colonel N. M. Wilson, granted leave.

Major S. R. Prall and Major J. S. Galvin have been confirmed in the Bombay Cadre of the Indian Medical Service (Civil), with effect from the 26th June, 1932.

Major J. S. Galvin is appointed as Officiating Presidency Surgeon, Bombay, *vice* Lieutenant-Colonel A. N. Thomas, D.S.O., proceeding on leave.

To be Lieutenant (on probation)

Geoffery Richard Callander Palmer. 17th December, 1934.

LEAVE

Colonel C. H. Reinhold, M.C., Inspector-General of Civil Hospitals, Punjab, is granted leave on average pay for two months and 20 days combined with leave on half average pay for three months and 26 days with effect from the 8th April, 1935, or any subsequent date on which he may avail himself of it.

Colonel N. M. Wilson, O.B.E., Inspector-General of Civil Hospitals, Central Provinces, is granted leave on average pay for four months with effect from the 9th May, 1935.

PROMOTIONS

Captains to be Majors

G. M. Irvine and D. Kelly. Dated 1st February, 1935.

S. D. Gupta. Dated 7th February, 1935.

Lieutenant (on probn.) to be Captain (on probn.)

B. F. B. Russell. Dated 1st August, 1934.

RETIREMENTS

Lieutenant-Colonel W. A. Mearns. 15th November, 1934.

Lieutenant-Colonel J. Kirkwood. 11th December, 1934.

Notes

SIEMENS X-RAY SPHERE

WHATEVER may be the view regarding the question of large or small x-ray plant, it cannot be denied that there are many fields of application in which there is a distinct demand for the smallest types. There is no sense in purchasing a four-valve apparatus for dental radiographic work only, and it is impossible to install a large output plant in a patient's house, for temporary use, to x-ray a broken leg for example. If such small apparatus is really to fulfil its function, its efficiency should not be below a certain level, the weight and volume being at the same time kept as low as possible.

Anybody attempting the solution of this problem will at first be tempted to secure the smallness of apparatus at the expense of efficiency and safety.

Reliability of operation should, however, in no circumstances be less than with any standard apparatus.



In high voltage technique, the oil-insulated high-tension transformer continues to dominate the field, because actually no other method of insulation offers the same security.

Although it is possible to obtain transformers of lighter weight by dry insulation, Siemens have, for reasons of greater safety, adhered to oil insulation.

The output of 10 mA at 60kV of the Heliodont has been proved correct by many years of experience; thus, in developing the new apparatus, they had no Heliodont and the well-known Nanos with the new apparatus tubes of smaller grid effect are used, which give higher efficiency and hardness of radiation.

It is obvious that the complete x-ray installation (transformer and tube housing) will be smallest if these parts are sufficiently closely arranged to permit of the almost entire elimination of high voltage leads. This measure, however, is not enough in itself to give a sufficient reduction in weight, as the transformer of normal design is much too heavy. It was only a radically new design of high tension transformer which enabled us to realize our aim.

A transformer of normal design consists of a rectangular core with suitably large opening for the copper winding.

This had to be a starting point for improvement. The high tension winding is, in accordance with known methods, and in keeping with normal requirements of safety, so strongly insulated with paper strips that the whole surface of the winding may be in contact with earthed parts (obviously with the exception of the connecting leads). The centre of the secondary winding follows orthodox design in order to permit of

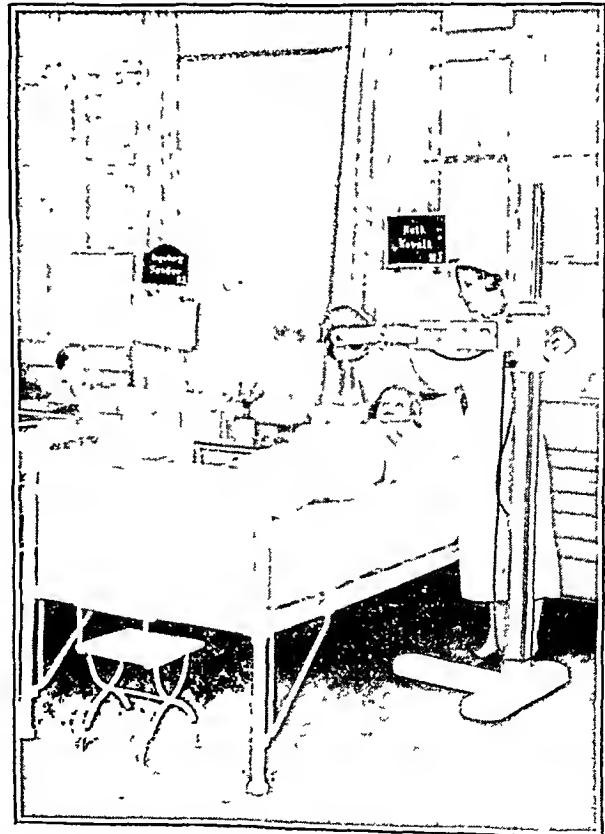
the measurement of the tube current by means of an earthed milliammeter.

The iron core, of entirely novel design, consists of a circular central portion passing through the middle of the copper coil, and simultaneously carrying the primary winding. The magnetic circuit of the remainder of the iron path is completed by U-shaped strips, which are superimposed in lap formation, and the ends of which abut square on the centre core. Proceeding from the outer circumference, where they are superimposed in lap formation, and cover almost the entire circumference of the winding, these strips are directed upwards, the nearer they approach the interior, until at the joints they run parallel to the axis of the central core.

This arrangement results in the dimensions of the transformer being but slightly increased by the iron. It is to be emphasized that with this design and in spite of its advantages, no projecting iron parts are required.

This form of iron core represents the minimum of mean length of the iron part, for no other form of iron core can be visualized which would result in a shorter mean length. From this it follows, on the one hand, that we have thus reached the minimum of core weight, and on the other hand the additional, and equally important, advantage is secured, that the outer dimensions of the transformer also represent a minimum, a very simple geometrical form, which can be encased without leaving free spaces, being attained at the same time.

In consequence, the quantity of oil required for saturating the insulation material of the high voltage winding is also reduced to a minimum. A third, if less important, advantage is secured by the shortening of the mean length of the iron part by the reduction



of the number of necessary ampere-turns, i.e., a reduction of the no-load current is obtained. It was

gathered does not seem to affect their potency, but, as a rule, the spring is regarded as the best season. The roots are cleaned and dried in the air.

Cultural experiments are being carried out in Germany and Austria, with a view to obtaining a small tap-root with as many lateral roots as possible; these are gathered every two or three years. In order to increase the value of the primula cultures, it has been suggested that the leaves should be used for a pharmaceutical or other purpose, because, when given in four times the dose, they have the same effect as the root-organs. Further, the pleasantly aromatic flowers of *Primula veris* can be used for the preparation of extracts.

Writing on the physiology and pharmacology of expectorants Dr. T. Gordonoff, of Bern, says:—

'Tussipept is a fortunate combination. It is an ammonium salt of primula-saponin, and I have frequently been able to convince myself of its value and activity'.

We have ourselves used Tussipept in a number of cases and have found it very useful as a relief-giving expectorant.

THE FURNISS CLAMP FOR INTESTINAL ANASTOMOSIS

With this instrument the technique of end-to-end, end-to-side, and side-to-side anastomosis of the intestine is greatly simplified; there is a consequent saving of much time during the crucial part of an operation, whilst it leaves the surgeon secure in the knowledge that there should be no subsequent intestinal leakage.

Closure of the blind end of a piece of severed gut can also be accomplished with ease, and for convenience the technique of this latter procedure will be described immediately after a brief description of the clamp itself.

Description of clamp.—An instrument in stainless steel, it is a bowel-crushing clamp, which will only crush and not cut nor tear the gut, and in which the fulcrum is at the tip of the blades. The handles can be locked together by means of a thumb screw, so that when in use it will act as a lever of the second degree and give an even grip throughout the whole length of its blades. The blades are of deep section, coarsely and transversely serrated on their approximating surfaces, whilst a longitudinal groove is cut down the centre of each serration. On the closure of the clamp, the serrations interdigitate to form a sinuous line, whilst the longitudinal grooves approximate so as to form a tunnel through which a pin may be inserted.

Technique employed.—It is recommended that the surgeon should make himself well acquainted with this in the post-mortem room before employing it in the operating theatre.

Clamp the gut in the blades of the forceps and lock the handles. Transfix the gut by inserting the pin down the tunnel formed by the two longitudinal grooves in the blades so that the walls of the gut will be held together. Do this whilst the gut is fairly loosely clamped by the blades; then tighten the clamp.

Remove the distal portion of the gut, preferably with a cautery; then remove the clamp. The walls of the cut end are now firmly closed and are held on the pin to the sharp end of which a guard is fixed. A sero-muscular continuous suture is now applied so as to invert the serrated cut edge. The pin is now removed, when the gut will be found to be effectively closed and, if necessary, can be doubly secured by further suturing. As an alternative to transfixing the gut with the pin, a needle with a catgut suture

attached can be used to transfix instead. On the clamp being removed, the suture is drawn right through and its two ends tightened and tied, when a final purse-string suture completes the closure.

End-to-end anastomosis.—The two loops of the gut (four walls) are clamped together, the pin inserted and the distal portions removed by the cautery. On removal of the clamp, all four walls will be found securely held by the pin, the point of which is protected. A sero-muscular continuous suture inverts the serrated edges, and is continued on the opposite side of the pin, whilst further interrupted sutures ensure greater safety. The pin is now removed and the lumen of the gut established by digitally intussuscepting the upper into the lower segment so as to break up the temporary union of the four intestinal walls.

End-to-side anastomosis.—The technique is similar to that of an end-to-end anastomosis with the exception that a wall of the larger gut is elevated by tissue forceps so as to form a fold which together with the loop of smaller gut is clamped in the forceps. The distal parts are then severed and the operation continued as described above.

Side-to-side anastomosis.—Here, from each loop, the wall is elevated and the two folds, thus formed, clamped together when a technique similar to that of an end-to-end anastomosis is followed.

This clamp is obtainable from the Medical Supply Association Limited, 167, Gray's Inn Road, London, W.C.1.

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Original Articles

TREATMENT OF PSORIASIS

By D. PANJA, M.B. (Cal.)
and

P. A. MAPLESTONE, D.S.O., M.B., Ch.B., D.T.M.
(From the School of Tropical Medicine, Calcutta)

(Department of Dermatology, financed by the Indian
Research Fund Association)

THE cause of psoriasis is not yet known, and the treatment is very unsatisfactory, for although many forms of therapy bring about partial or total disappearance of the lesions, the tendency to relapse is in no way affected; so that permanent cure is rare. Many theories* as to the cause of the disease have been advanced and we have investigated several of these, the results of which are given below.

Toxin theory.—It is said that the lesions are produced by a circulating toxin originating from a septic focus situated somewhere in the body, most often in the intestines. On this account there are a number of vaccines on the market prepared from the intestinal flora; these are claimed as specifics for psoriasis. In a series of cases examined we took four to six samples of stool from each case and in some we found *Entamoeba histolytica* cysts, in some vegetative forms of the parasite and on culture found various non-lactose fermenters belonging to the Flexner and Salmonella groups of bacteria. Treatment with either emetine or autogenous vaccines of the bacilli gave good results in a few cases only, and after considerable experience with the above treatment we have come to the conclusion that intestinal sepsis is not the cause of psoriasis.

Parasitic theory.—The disease is a local infection of specific bacteria or fungi; but this has not been definitely proved. We tried cultures from the lesions in various media at different temperatures, both aerobically and anaerobically, but did not get uniform results; staphylococci, yeasts, aspergillus and various other organisms were obtained. It has also been suggested that the parasite may be a filter-passing virus and the following workers have treated several cases based on this theory. von Mihailovic (1929) treated a few cases with alcoholic extract from psoriatic scales with variable success. Campbell and Frost (1930) treated fifteen cases by intramuscular injections of a suspension of the patient's scales finely ground in alcohol; all patients responded to this form of treatment in varying degrees. In 1931 Toma treated three cases with scale suspension

with the addition of 0.25 per cent formalin. Campbell and Frost (1932) published a further record of fifty cases treated with alcoholized scale suspension. They claimed that there was no reaction after the injections. Wrong (1933) treated ten cases by Toma's method; five out of the ten definitely improved, one of them being entirely cured.

We at first followed the technique of these workers using injections of alcoholized and formalized scale suspensions. The alcoholic suspension caused a good deal of burning pain at the site of injection and hence patients did not submit to it readily. The formalized saline suspension also caused pain and marked necrosis as well at the site of injection. In spite of these objections we persisted in treating five cases; but it was found that a large number of injections were necessary, and an adequate supply of scales was not available. Owing to these drawbacks we decided to cut out a piece of tissue from psoriasis lesions and make an emulsion of it for injection. Our idea was that the parasite, if it is a filtrable virus, will be found not only in the scales but also deeper down in the dermis. This probability is supported by the fact that the epidermal changes have been shown to follow changes in the dermis such as dilatation of vessels, elongation of the papillae, etc. These pathological findings suggested that the filtrable virus might be present in the corium in a more virulent state than in the more or less dry epidermal scales. The following technique was accordingly adopted.

An acute or a subacute early patch is selected and dabbed with rectified spirit, then a small piece of the diseased skin to the depth of the corium is snipped off with a pair of sterile curved scissors. The piece is weighed and mixed with pumice-stone dust and crushed in a sterile mortar until a uniform paste is produced. A few drops of normal saline may be necessary to make a good paste. The paste is then mixed with a measured quantity of sterile normal saline to make up the suspension to the strength of 10 mgm. in 1 c.cm. It is then filtered through a Keiselghur filter and the filtrate thus obtained is filtered again through sterilized Pasteur-Chamberland L3 candles, and 0.05 per cent phenol is added to the final filtrate. The initial dose was 0.1 c.cm. and it was injected intradermally. The injections were repeated every third or fourth day, increasing the dose each time by 0.1 or 0.2 c.cm., up to 1 c.cm. When the dose reaches 0.5 c.cm., subcutaneous injection is better as by this means the pain of intradermal infiltration is avoided. A course of ten to twelve injections was given as a rule and if necessary this was repeated after a fortnight; but only in a very few cases was a second course necessary. There was no reaction nor pain following these injections.

*The trophoneurosis theory has been long ago abandoned, so we have not studied it and there is a new therapy, advanced by Gruetz (1934), which we have not yet had time to investigate.

Twenty-eight cases were treated by the above method, the detailed results of which can be seen in the table. Four were quite cured; eight were nearly cured, a few minute spots only being left; two cases were apparently cured but

(3) This has been found less painful than the formalized or alcoholic filtrates recommended by other workers.

(4) A record of treatment of 28 cases by this method is given.

TABLE

Number	Caste and sex	Age in years	Duration of disease in years	History of relapses	Number of injections	Total amount in grammes	Result	REMARKS
1	M., M.	30	3	Every winter	12	1	Cured	No relapse this season.
2	H., M.	45	12	Worse every rainy season.	9	1	Nearly cured	No relapse for 10 months.
3	H., M.	25	7	Worse every rainy season.	6	0.85	Cured	Milder relapse in the beginning of winter and responded to treatment.
4	M., M.	45	4	Every winter	6	0.6	Cured	No relapse for 10 months.
5	H., M.	23	3	Every summer	7	0.9	Cured	No relapse for 12 months.
6	H., M.	16	3	Every summer	10	1.2	Cured	No relapse for 8 months.
7	H., M.	35	10	Every summer	12	1.5	Cured	No relapse for 1 year.
8	H., M.	17	4	Every winter	12	1	Cured	Lost sight of.
9	H., M.	35	12	Every rainy season.	10	1.1	Cured	No relapse for 16 months.
10	H., M.	45	5	Throughout the year.	7	0.14	Cured	After 1 gramme in 5 injections severe reaction. Treatment stopped for 14 days and 2 further injections of 0.02 gramme each, resulted in cure.
11	H., M.	..	14	Rainy season to winter.	10	0.1	Three-quarters cured.	Lost sight of.
12	M., M.	..	16	More or less all the time.	2	0.2	Disease flared up.	Patient has come again after 10 months and is being treated again.
13	H., M.	30	9	Every winter	10	0.8	Nearly cured	No relapse for 10 months.
14	E., M.	25	8	Irregular	8	0.8	No effect	Lost sight of.
15	H., M.	31	7	Irregular	12	1.1	Cured	No relapse for 16 months.
16	H., F.	14	8	Every rainy season.	8	0.6	No effect	Lost sight of.
17	H., M.	31	4	Every rainy season.	10	0.7	Cured	Lost sight of.
18	H., M.	37	1	Every rainy season.	6	0.5	Nearly cured	No relapse for 6 months.
19	H., M.	40	25	Irregular	10	0.9	Nearly cured	No relapse for 12 months.
20	H., M.	40	16	Always present	12	0.4	Cured	No relapse for 5 months.
21	M., M.	22	3	..	5	0.01	Cured	No relapse for 6 months.
22	H., M.	42	3	..	6	0.08	Nearly cured	No relapse for 11 months.
23	M., M.	30	2	..	14	1.2	Cured	No relapse for 13 months.
24	M., M.	40	10	Rainy season	10	0.8	Cured	Relapse after 2 months.
25	E., F.	24	5	Irregular	9	0.9	No effect	..
26	H., M.	31	2½	..	9	0.6	Nearly cured	Has not become worse again.
27	M., M.	40	10	Every winter	8	0.4	Nearly cured	Relapse after 6 weeks.
28	M., M.	45	12	Every winter	7	0.4	Nearly cured	No relapse after 14 months.

H. M.=Hindu male. H. F.=Hindu female. M. M.=Mohammedan male. E. M.=European male. E. F.=European female

relapses took place after three months and they are now improving on another course of injections; three cases did not respond to treatment and one flared up after two injections. We got equally good results with an autogenous filtrate or one from some other patient.

Summary and conclusions

(1) Our investigations have led us to believe that the toxin theory and the theories of bacterial or fungus infection as the cause of psoriasis are not correct.

(2) A new method of making filtrates of material from the lesions of psoriasis for treatment of the disease is described.

(5) The results are so favourable that the theory of a filtrable virus being the cause of psoriasis appears to be well founded.

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SPLENECTOMY FOR TROPICAL SPLENOMEGALY

By A. N. PALIT, F.R.C.S. (Ed.)

LIEUTENANT-COLONEL, I.M.S.

Superintendent, Orissa Medical School and Civil Surgeon, Cuttack

Of all the various organs of the body even to-day the spleen deserves the name of the organ of mystery: it has been so described during the ages. It has no duct, no definite or peculiar secretion or function of its own, and, although it is affected seriously in many infections and in certain blood diseases, its removal seems to result in no permanent changes in the physiology of the body. Many persons on whom splenectomy had been performed remained in apparently excellent health for many years. Splenectomized women have passed through normal pregnancies, though miscarriage has been known to occur. Even in the young, splenectomy has a negligible influence on growth. Congenital absence of the spleen also seems to be compatible with health and life; at least two such cases are on record; one patient died of obstruction of the common bile duct at the age of 32, and the other of pulmonary tuberculosis at 45. Microsplenia has also been observed in some cases, a woman with a 21-gramme spleen lived to be 73. Even in disease the influence of the spleen is not easily distinguishable.

For certain pathological conditions which may or may not come under the vague nomenclature of 'tropical splenomegaly' it has been universally agreed that the spleen should be removed. The reasons for so strongly recommending such a serious operation are many:—

(1) Mechanical—the ill effects of having to carry about a huge functionless diseased organ inside the abdominal cavity can easily be guessed. Pressure and dragging on the different important organs must be concomitant with such enlargement. Removal of the spleen without any further treatment in case of malarial enlargement is followed by rapid improvement in general health.

(2) Danger of rupture is ever present, either spontaneous or more often as the result of even a slight blow or fall.

(3) Rapid return to health after splenectomy in certain blood diseases, such as splenic anæmia.

(4) The liver, which is enlarged in almost every case of splenomegaly, diminishes in size after splenectomy. The improvement is no doubt partly due to mechanical causes. The portal circulation is relieved and the amount of blood that the liver has to deal with is perhaps cut down by half or even more. (In health the normal spleen supplies one-seventh of the blood which goes into the portal vein.)

(5) Splenectomy is the only treatment which offers any measure of success in certain conditions.

Contra-indications to operation:—

1. Ascites.
2. Marked enlargement of superficial abdominal veins indicating advanced hepatic cirrhosis. These cases can only be regarded as grave surgical risks and will most probably die of hæmorrhage.
3. A fixed and immovable spleen.
4. Jaundice, unless the condition improves under medical treatment it would perhaps be very unsafe to operate.
5. Hodgkin's disease and Gaucher's disease.
6. Leukæmia. Splenectomy may be done after reducing the size of the spleen by radium. The operation will prolong life but will not cure the disease. Giffin states that the operation may be done in the very chronic form of the disease only, with a very fibrous spleen and a not very high white cell count.

It seems rather a pity that splenectomy has not been practised more often in India, though in Egypt it is a fairly common operation. I hope my experience, limited as it is, will be of some value.

Summary of cases

Results:—

Number of cases operated on	..	10
Recovered	..	9
Died of hæmorrhage from separated adhesions	..	1
Known to be well one to two years after operation	..	3
Known to be well up to six months after operation	..	5

Of the 9 who recovered, 8 were discharged from hospital in good health; one went away before he had regained his health, having developed broncho-pneumonia, then hepatitis and malaria. Benign tertian parasites were found in his blood. He was still debilitated when he left hospital but otherwise well.

Age and sex of patients.—One patient was 15 years old and one 16, five were between 20 and 35, two were 40 and one 45; only two of the patients were females (aged 16 and 40), and the patient who died was a man 40 years of age.

Malaria.—All gave previous history of fever, which is only to be expected, and six gave a definite history of rigors and intermittent attacks of fever. Two showed a benign tertian infection.

Ankylostoma infection.—All were infected with hookworms, some heavily. Most of them required two or three courses of treatment to eradicate the infection. This fact is interesting, because it is possible that ankylostomiasis plus malaria is the cause of many of

these splenomegalies, that are not due to kala-azar.

Kala-azar.—None of the patients were suffering from kala-azar.

Splenic anæmia.—Two, and perhaps three, were suffering from this disease. The red corpuscles were below 3 millions and leucocytes about 5,000 per c.mm. The liver showed cirrhosis, and adhesions were dense. Two of them gave a definite history of hæmorrhage from the bowel; one was doubtful. One, the girl of 16, had melæna and petechial hæmorrhages under the skin after operation; this was one of the patients that died subsequently.

Liver.—All showed enlargement of the liver from two to six fingers below the costal arch. Two showed a distinctly hobnailed appearance though very slightly. In two others the surface of the liver was reticulated. The liver was reduced in size in every case after operation.

Jaundice.—Eight had jaundice.

Ascites.—None had clinical ascites, though during the operation a little fluid was seen in some cases.

Duration of splenic enlargement.—Two gave a history of splenic enlargement for eight years, one each for seven and six years and two each for five, four and three years.


Size of spleen.—On admission the spleen in every case was much bigger than at the time of operation. In most cases it extended well over the middle line and below the umbilicus. In two cases it practically filled the whole abdomen. In one the swelling was cystic (this case will be given in detail). In the boy aged 15 even one finger could not be introduced between this organ and the symphysis pubis. The average weight of the spleens after removal was 4 pounds; the two biggest weighed 5 pounds 12 ounces and 5 pounds 6 ounces; and the smallest 2 pounds 12 ounces.

Blood.—Red cells varied from 2,700,000 to 3,700,000 per c.mm. before operation, but showed considerable improvement some time after operation. The improvement was gradual and maintained. White cells were 3,000 to 5,000 before, and went up to 6,000 to 11,000 per c.mm. after operation. Lymphocytes varied from 24 to 35 per cent and polymorphonuclears from 50 to 75 per cent; there was either a slight increase or decrease after the operation. Hæmoglobin was about 55 to 65 per cent and colour index was about 0.5 to 0.6. The latter showed steady and gradual improvement after operation.

Treatment.—Every patient was first admitted to the medical wards where a clinical examination and routine tests were done. If malaria was diagnosed or suspected, a thorough course of quinine and atebrin or quinine alone was given. Ankylostomiasis was treated with tetraform. The usual spleen mixture followed by arsenic and iron, generally cacodylates and Fraisse's ferruginous ampoules, were given.

We got very good results from cacodylates especially. Aolan was given to stimulate the reticulo-endothelial system in some cases. The spleen decreased in size, and the condition of the blood and general condition of the patient improved. Medical treatment was then discontinued and only bitter tonics with strychnine and plenty of milk ordered. When the patient was considered ready, liberal doses of glucose were given for three or four days preceding the operation.

The operation

'The removal of the spleen may be an operation of the greatest simplicity or of almost insuperable difficulty. Everything depends on the presence or absence of adhesions which may bind the organ inseparably to the parts around' (Moynihan). In my cases general anæsthesia with chloroform only, *faute de mieux*, has always been used. The incision I make has always been the left paramedian, extending from the costal arch to half-way between the umbilicus and the symphysis pubis, but in case of very big enlargement of the organ to the latter bone. The rectus is pulled outwards and the abdomen opened in the line of the incision. Even in the case of the biggest spleen measuring, while fresh, 13 by 10½ inches I did not experience much difficulty, though I dare say a vertical paramedian extending at right angles or obliquely outwards might give better exposure. Even a -shaped incision may be

made, the vertical line being a paramedian or a median one. But I think a vertical incision gives a better view of the pedicle, where the most difficult and important steps of the operation lie. As soon as the peritoneum is opened, the liver and gall-bladder are rapidly examined, the amount of enlargement and the degree of cirrhosis, if any, noted. The pedicle is next examined and the nature of adhesions determined. The right hand is now passed on to the convex upper and outer surfaces of the organ to examine the density of the adhesions. The operator has now to make up his mind if he can safely remove the spleen; the attempt should be abandoned if he finds it impossible to sever the adhesions, or if laceration of the spleen in an attempt to do so seems unavoidable. If in doubt it would be better to give up the attempt.

Now the removal of the spleen may be accomplished by one of two methods:—(1) Separation of the adhesions on the upper and outer surfaces of the organ, its delivery outside the abdomen, and finally ligation of the pedicle; this is the method of choice.

(2) Ligation of the pedicle first, freeing all other adhesions, and delivering the organ when it is absolutely free; this method is to be preferred where the adhesions are dense and the

spleen friable. Uncontrollable hæmorrhage may occur if the splenic vessels are not ligatured first before the adhesions are freed, either from (a) the separated adhesions, or (b) tearing of the splenic tissue, or (c) from a torn vein of the pedicle where these enter the hilum. On the other hand access to the pedicle is more difficult and the tail of the pancreas is more likely to be injured or ligatured. The latter lies touching the spleen, or even adhering to it and to the pedicle, but under it, and can be better defined from behind. In my earlier cases I used only the latter method, but with more experience I use whichever method seems to be better suited to the case.

The following method will perhaps be found suitable for most cases. Define the pedicle first, separate all adhesions of the omentum to the spleen between series of ligatures. Big veins will often be found coursing through them, sometimes as big as one's finger. Adhesions may be light or dense, few or many. The gastro-splenic omentum which contains the vasa brevia vessels is defined if possible (it often merges into the other adhesions) and divided; the adhesions to the stomach are dealt with, taking care not to injure the organ. The left gastro-epiploic artery should be saved if possible, this really does not matter very much as the blood supply of the stomach is abundant, specially in most cases of enlarged spleen. According to Millar it may be an advantage to ligature this artery, as it might reduce hæmatemesis in cases of splenic anæmia. Now the pedicle comes into view clearly and the vessels can be ligated separately, this should be done between ligatures. It is better not to use any clamps in this area, as softened veins might be torn by the clamps. The splenic artery should be ligatured first, if possible, but I find that any attempt to do this leads to severe bleeding from torn veins. Similarly separating the pancreas also very often causes hæmorrhage. On one occasion I had to tie off the tail of the pancreas to save the patient's life from hæmorrhage, with no other apparent ill effect than a sharp rise of temperature and some pain lasting for four or five days. The veins in malarial enlargement are thin and may cut through when a ligature is applied. Nowadays I use no. 3a or no. 4 catgut for ligaturing the pedicle vessels. In one of my cases the main vein was cut through three times—at last I wrapped a piece of omentum round it and applied a double thick ligature, which luckily held. Sometimes the veins after ligaturing may look like Oxford sausages; my advice is to leave them alone and not to handle them.

If the pedicle lies very deep or cannot be conveniently dealt with for any other reason, I leave it alone and proceed with the separation of the other adhesions. This division of the pedicle may be a simple matter, but more

often it is a most difficult and painstaking bit of surgery. The whole right hand is now passed above the upper pole, gently separating the adhesions; by carefully working with the right hand and pulling away the organ with the left, bands may be made to form, which are clamped and divided. One such band is called the phrenico-splenic ligament; this often contains small vessels. Next the hand sweeps over the outer surface of the organ, separating adhesions, and, if bands form, these are clamped and divided. The spleen is now delivered and wet hot towels are packed into the empty space to check oozing which is considerable at first. This is very important. The pancreas is next defined and isolated. The vessels of the pedicle are picked up separately or at least in groups, ligatured and divided. Massive ligature of the whole pedicle should never be attempted—the results will most likely be disastrous. Some of the vessels will most likely either rupture or slip out of the pedicle. I often apply two separate ligatures on big vessels in case one cuts through or slips off. The spleen is now free and is removed. The pancreas is examined carefully to see if there is any bleeding. The hot packs are removed and the empty space is carefully examined for any bleeding points. The clamps, if not already removed, are taken away after ligaturing the bands previously referred to. A bleeding point on the under surface of the diaphragm can be secured with the help of a fine needle and catgut, using Lembert stitching. During all these manœuvres the utmost gentleness should be exercised.



Spleens removed by writer.

There should be no pulling or torsion of the pedicle and the spleen should be handled with the greatest care, to obviate tearing or rupturing of veins, or of the spleen itself. The abdominal wound is now closed in layers in the usual way, using Michel's clips for the skin, as time is saved thereby. No drainage is used. The appendix may be removed, if it is considered necessary and if it is not likely to prolong

the operation for more than three or four minutes. Although I always remove the appendix as a routine in all other laparotomies, I generally leave it alone in splenectomies.

For the after-treatment plenty of glucose-D is relied on.

Special dangers

The greatest danger of this operation is hæmorrhage, not so much from the greatly dilated vessels of the pedicle, but from accessory veins in the capsule of the spleen which form in the adhesions between the convex surface of the spleen, especially at its upper pole, and the diaphragm or the abdominal wall, and also from a torn or lacerated pancreas. Death from thrombosis of the portal vein is also said to occur. As the liver is also affected there is also danger of failure of the liver function after general anæsthesia. This may be avoided by giving gas and oxygen but, as nitrous oxide is not available in India, it is very difficult to obtain adequate supplies. The general health of the patient is as a rule poor and he is anæmic, so shock has to be combated. Slight laceration of the tail of the pancreas is sometimes unavoidable.

The one patient I lost died of hæmorrhage; during the operation there was smart oozing from the under surface of the diaphragm which stopped after pressure with a very hot towel. The oozing had commenced again and must have been considerable, from the findings during post-mortem examination. The adhesions in this case were very dense and I would have given up the attempt had I not already dealt with the pedicle.

Complications.—Two patients developed pneumonia, two hepatitis and two a relapse of malaria, but of these one patient had both pneumonia and hepatitis and another hepatitis and malaria, so that only four patients had complications. One died of hæmorrhage the day of the operation and five recovered without any trouble.

Ligature of the splenic artery only.—I have no experience of this. Many observers have suggested it but few have practised it. The only surgeon who definitely condemns it is Benhamou in his book *L'Exploration Fonctionnelle de la Rate*; he says necrosis is sure to follow. In my opinion it is too risky and, even if the patient recovers, collateral circulation will surely be established and the diseased spleen will be left to carry on its nefarious work.

After-treatment.—This is the same as in all laparotomies. Usually patients have not been given any special treatment to build up their blood, such as liver or liver extracts, meat juice, or even iron and arsenic after the operation, as we wanted to note the result of the splenectomy alone, these operations being in the nature of surgical research, but of course

there have been exceptions. We have never been disappointed so far in the results of the operation. Patients who do not develop complications steadily improve in health till they are discharged or want to go away for domestic reasons. The average stay in hospital after the operation has been 44 days and before operation about seven weeks. Five of the patients have been seen recently and were in excellent health.

CASE REPORTS

(i) *Malarial enlargement—intracapsular laceration.*—Dhobi S., male, aged 26 years, was admitted on the 28th October, 1932, for a huge cystic tumour filling the whole abdomen. The enlarged spleen could be felt along the left border of the cystic swelling. The abdomen was markedly protuberant specially above the navel. 'Ruptured spleen' was suggested but the diagnosis was not accepted.

Previous history.—The patient gave a history of repeated attacks of fever with rigors for the last five years. The spleen became very enlarged. Once it was massaged and after that it became tender and the whole abdomen swelled up. This happened a year previously and since then he had been laid up in bed. (This statement was accepted with reservations at the time.) He was very emaciated and jaundiced. He was treated with quinine, spleen mixture, iron and arsenic, etc.

The patient was operated upon on the 1st December, 1934. A left paramedian incision extending from the costal arch to a point two inches from the symphysis pubis was made. On opening the abdomen a large dark-blue cystic swelling was seen which burst as soon as I tried to manipulate it. The cyst was full of fluid and clotted blood. There was severe hæmorrhage, the cyst was plugged with towels and the pedicle was tied as quickly as possible. A big vein ruptured and had to be tied again.

The spleen without blood or clots weighed 5 pounds 12 ounces and measured 13 inches by 10½ inches by 8½ inches. The liver was enlarged two finger-breadths below the costal arch. Convalescence was uninterrupted except that he had a relapse of malaria and benign tertian parasites were found in his blood. He was treated with quinine and atabrin.

Blood counts:—

	7-11-32.	11-1-33.
	Per c.m.m.	Per c.m.m.
Red blood cells ..	3,200,000	4,100,000
White blood cells ..	4,375	11,000
	Per cent	Per cent
Polymorphonuclears	53	42
Lymphocytes ..	35	47
Hæmoglobin ..	60	75

The patient improved in health and strength and was discharged on 26th January, 1933. He is a coolie working in the bazaar and used to come regularly once every three months for examination. He was doing hard work and earning his livelihood two months after the operation. He is in perfect health now. He has had no relapse of malaria.

(ii) *Malarial spleen with complications.*—M. S., male, aged 22, resident of Balasore, admitted on the 1st February, 1933. Had enlarged spleen for the last eight years. Used to have fever with rigors but not lately. Spleen was hard, movable, extended 3 inches below the level of the umbilicus. Liver extended 3 finger-breadths below the costal arch. Slight jaundice. Operation on the 3rd March, 1933. The surface of the liver was reticulated. There was a small accessory spleen, the size of a golf ball, which was also removed. The spleen was fairly adherent, bled freely, bleeding was stopped with ligatures and hot packs.

The next day he had a sharp rise of temperature; benign tertian parasites were found. After a fortnight he got hepatitis and jaundice and was treated with emetine, etc. Later he got a pneumonic patch at the right base, and still later pleurisy; blood-stained fluid was aspirated. However, he recovered from all these and was doing well. On receiving a telegram from home he left on the 23rd April, 1933.

Blood counts:—

	24-2-33	23-4-33
	Per c.mm.	Per c.mm.
Red blood cells ..	3,700,000	4,200,000
White blood cells ..	3,000	7,200
	Per cent	
Polymorphonuclears	65	
Lymphocytes ..	30	
Hæmoglobin ..	65	

The spleen weighed 5 pounds 6 ounces and measured 12 inches by 10 inches. The spleen marked 'S' belonged at one time to this patient. He wrote some time afterwards, in reply to our letter, to say that he was in good health.

(iii) *Splenomegaly of doubtful origin*.—N. S., male, aged 15 years, resident of Puri, admitted on 14th September, 1933. Had a very large spleen for the last seven years. No definite history of rigors, only occasional attacks of fever. The spleen on admission nearly touched the symphysis pubis; one could hardly push a finger between the spleen and the bone. The patient was very anæmic. There was a heavy ankylostoma infestation. He was in the medical ward for three months and had many forms of treatment, viz, spleen mixture, Fraisse's ferruginous ampoules, cacodylate liver, raw meat juice, etc. The spleen was reduced in size by about two inches, the patient improved in general health, so operation was decided upon at the request of the boy's father, though he was still a grave surgical risk.

Operation on the 24th January, 1934. A left paramedian incision extending from the costal to the pubic arch was made. Liver was four fingers below arch, looked very congested. The omentum was adherent to the gall-bladder, though no calculus could be felt. There were far too many adhesions, the omentum was adherent to the spleen all over, the spleen was firmly adherent to the diaphragm and abdominal wall. A vein ruptured during manipulation and there was smart hæmorrhage. The spleen weighed 4 pounds 8 ounces, measured 10½ inches by 6 inches by 4 inches. Blood count on different dates was as follows:—

	31-9-33	4-1-34	19-2-34
	Per c.mm.	Per c.mm.	Per c.mm.
Red blood cells ..	3,200,000	4,200,000	4,300,000
White blood cells ..	8,400	5,625	11,250
	Per cent	Per cent	Per cent
Polymorphonuclears	47	56	62
Lymphocytes ..	17	25	24
Hæmoglobin ..	50	65	75

The liver was reduced and the patient made an uninterrupted recovery. The father of the patient took him away on 19th February, 1934, though I should have liked to have observed him for a little while longer. He was seen at Puri during the Ratha Jatra festival and appeared to be quite well.

(iv) *Splenomegaly—presumably splenic anæmia*.—G. P., male, aged 40 years, cultivator, admitted on 4th May, 1933. Had enlarged spleen for the last two years, but not much fever and no rigors. Slight jaundice. Liver tender, 7 finger-breadths below costal arch. Urine high coloured and scanty. Gave history of melæna and hæmatemesis.

Blood count:—Red blood cells 2,900,000, hæmoglobin 55 per cent, white blood cells 5,625, polymorphonuclears 58 per cent, lymphocytes 30 per cent.

Pre-operative treatment had no effect on the blood count. Operation on 27th June, 1933. The spleen felt to be firmly adherent to the under surface of the diaphragm; adhesions all round were numerous and dense. While examining a big vein it ruptured and the pedicle had to be tied first, so when I found the dense diaphragmatic adhesions I had no option but to proceed with the operation. There was much oozing from the diaphragm which partially yielded to pressure with very hot towels. Lambert stitches were tied, but could not have been very successful, as the patient bled to death during the night. At the post-mortem examination it was found that the whole of the denuded diaphragmatic area had bled profusely. The liver showed slight hobnailing, but the surface was markedly reticulated, there were hard white lines round the protruding hobnails. The stomach wall was thickened.

(v) *Splenomegaly—origin doubtful*.—G. S., male, aged 30, admitted on the 14th September, 1933. Occupation peasant farmer, but had been working as durwan in East Bengal for the last eight years. About five years previously he had been having fever, with or without rigors; had a lot of medicines and a few injections. Became very weak and emaciated and left Bengal. Since then he had been getting fever now and again; spleen kept on increasing in size and he had not been able to do any work. He had been a muscular man at one time. He might have been a case of kala-azar, but the aldehyde and urea-stibamine tests were negative. Quinine, iron, etc., did not have much effect, but a course of 12 cacodylate injections caused the size of the spleen to be reduced somewhat and brought about a marked change in his general condition. He was operated upon on 24th October, 1933. The adhesions were extensive but were easily dealt with; the spleen weighed 4 pounds 1 ounce measured 9 inches by 6 inches by 4 inches. Blood count at different times was as follows:—

	2-8-33	23-10-33	15-12-33
	Per c.mm.	Per c.mm.	Per c.mm.
Red blood cells ..	2,700,000	3,600,000	4,300,000
White blood cells ..	5,000	6,500	9,375
	Per cent	Per cent	Per cent
Polymorphonuclears	54	60	52
Lymphocytes ..	30	28	32
Hæmoglobin ..	50	65	80

The liver was two fingers below costal arch when admitted and at the time of operation it showed a distinctly reticulated surface. Soon after operation he developed hepatitis and the liver enlarged further to four finger-breadths below costal arch. The inflammation subsided with emetine, quinine, liver tonics, etc., but the enlargement remained.

Three months after operation the liver was still tender and was further enlarged to seven fingers below costal arch. Otherwise the patient was fairly healthy and had put on weight. He was discharged on 4th January, 1934, on account of misconduct.

Seven months after operation he came again to see me as I had promised him a wardship in the Jail if he got fit again. Liver was not tender but still three fingers below the costal arch though only at the gall-bladder area.

Ten months after operation the liver could only be felt just near the gall-bladder, about one finger-breadth enlargement below and about two fingers wide. Again he claimed the promised wardship. On being told that the liver must be perfectly healthy before he could be given a wardship, he requested that his liver should be removed as otherwise he is strong and healthy.

EPIDEMIC MEASLES IN ASSAM

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Introductory.—During the spring of 1934, the province of Assam was visited by a severe epidemic of measles, mostly prevalent amongst the labour forces of tea gardens and the inhabitants of neighbouring *bastis*. The epidemic soon assumed pandemic proportions in Assam, continued throughout the remainder of the year and extended into 1935. At the time of writing, this pandemic is still active, although in many places it has tailed off, and, in some districts, has now completely ceased. The disease was prevalent in varying degrees of incidence and severity in both the Assam and the Surma Valleys.

It is difficult to find records of former epidemics, but Assam has not been visited by such a widespread wave of measles within the last 12 years.

Literature on measles in the tropics is scanty and the object of the present article is to record the present epidemic and its main features, for comparison with similar epidemics in colder climates. Particularly it is desired to point out the effects of different treatments both as regards prophylaxis and cure.

It is not proposed to include a survey of the whole epidemic but merely to confine observations to measles in the group of tea estates which are under the writer's personal medical control.

Segregation.—The difficulties which attend all attempts at complete segregation of measles cases and their contacts on tea gardens will be too well known amongst those who have had to deal with similar labour forces to need any emphasis. The average Assam coolie is ignorant of any laws regarding segregation and, however rigorous the steps taken to secure this may be, the end-results, in most cases, are disappointing.

When the number of cases on any garden is large, segregation becomes increasingly difficult and the necessity for leaving a sufficient labour force available to carry on the essential work of the garden becomes a real problem in economics. Most tea-garden managers adopt a definitely pessimistic attitude towards segregation *per se*, and, although this is not advocated from the correct medical point of view, some reasonable compromise is generally accepted as the final solution.

In the present epidemic, as far as my own group of gardens was concerned, segregation was carried out as rigorously as was humanly possible, although, in some instances, a widespread attack of measles in the lines rendered segregation difficult and abortive.

Thirteen gardens under my medical care were affected.

Epidemiology

Date of origin.—The first appearance of the present epidemic of measles in the province was registered on 2nd February, 1934, in the Surma Valley and on 7th March, 1934, in the upper or Assam Valley. The first case of measles reported in this district was on 29th May, 1934, and, for some time, measles was confined to this garden, but was prevalent on neighbouring gardens not under my supervision; this case was a coolie who had returned from a visit to friends on a measles-infected garden in another part of Assam.

This seemed to present an opportunity where rigid segregation could be attempted with a reasonable expectation of success, and accordingly all the usual steps were taken without delay. Success seemed probable, but as almost certainly other cases had already had contact with measles from outside sources, partial success only was attained.

Neighbouring gardens of the company were not affected until a much later date, and thus, up to a point, a modicum of success must be attributed to the prophylactic measures taken. Later, the epidemic was continued by the spread of measles from surrounding areas, and finally every garden in the group paid tribute to the scourge.

Incidence of measles.—Table I shows the incidence of measles on each garden and the percentage of the total population affected. The gardens are numbered in the sequence in which the disease manifested itself. The dates of previous epidemics are also recorded in the last column.

From the table it will be seen that the first appearance of measles was on a garden which had been visited with a severe epidemic of measles in September 1930. This accounts for the small number of cases on the garden, as the immunity conferred by the previous severe epidemic limited the occurrence of a further outbreak. Garden 2 which had no such immunity was the focus of a severe epidemic which affected 12.7 per cent of the total population. The measures taken on this garden to isolate it from its neighbours were evidently fairly successful as no further outbreak of measles occurred until garden 3 was infected on 15th August, 1934. This infection was brought from an outside source and in no way induced by the epidemic on garden 2. This is borne out by the fact that the three gardens which adjoin no. 2 estate were not infected until 1st October, when garden 2 had been clear of measles for four weeks. Garden 3 was remote from no. 2 and adjacent to an infected garden outside my jurisdiction.

Measles continued until all gardens were affected and it is still present on two gardens in the group.

TABLE I

Number of gardens	Date of commencement	Total population	TOTAL CASES OF MEASLES		Percentage of population affected	Number of deaths	Percentage mortality	Date of last epidemic of measles
			Children under 12 years	Adults				
1	28-4-34	1,093	5	..	0.46	nil	..	June 1930.
2	29-5-34	984	120	5	12.70	5	4.0	1919.
3	15-8-34	1,834	243	8	13.69	4	1.59	1913.*
4	1-10-34	615	92	20	18.21	1	0.89	1912.
5	21-10-34	1,300	56	2	4.26	3	5.17	1919.
6	11-11-34	1,860	40	9	2.63	..	..	1930.*
7	12-11-34	4,106	54	6	1.46	..	..	November 1929.
8	16-11-34	929	5	..	0.54	..	..	1912.
9	19-11-34	1,380	34	3	2.68	..	..	1914.
10	20-11-34	850	89	7	11.29	3	3.12	1912.
11	12-12-31	674	19	2	3.12	..	..	1914.
12	1-1-35	1,706	7	..	0.41	..	..	June 1928.
13	29-2-35	1,017	25	2	2.05	3	11.11	1929.*
GRAND TOTAL	..	18,408	789	64	4.63	19	2.23	*Few cases only.

Complications

The incidence of complications varied from garden to garden; in garden 10 it was as high as 38.54 per cent and in garden 2 it was only 8.00 per cent. In the whole group, 150, or 17.58 per cent, had complications.

Table II shows the type of complication present and the relative percentages in which they occurred.

TABLE II

	COMPLICATIONS		DEATHS	
	Number of cases	Percentage of total	Number	Percentage of total mortality
Broncho-pneumonia ..	46	30.66	9	47.38
Colitis and diarrhoea ..	46	30.66	4	21.06
Bronchitis ..	19	12.67	1	5.26
Ophthalmia ..	12	8.00	..	..
Otitis media ..	6	4.00	..	..
Laryngitis ..	5	3.33	1	5.26
Œdema of glottis ..	1	0.67	1	5.26
Otorrhoea ..	5	3.33	..	..
Panophthalmitis ..	3	2.00	..	..
Furunculosis ..	2	1.33	..	..
Whooping cough ..	1	0.67	..	..
Abortion ..	1	0.67	..	..
Heart failure ..	1	0.67	1	5.26
Dysentery ..	1	0.67	1	5.26
Cancrum oris ..	1	0.67	1	5.26
TOTAL ..	150	100.00	19	100.00

Mortality

Table II shows the percentages of mortality arranged according to the cause.

The pulmonary group thus accounted for 52.64 per cent of the mortality. One patient died of œdema of the glottis of very sudden

onset. This is a rare complication and usually occurs in the prodromal stage. Two cases were recently reported by Oliver and Turner (1933). Cancrum oris occurred in one case and is almost a hopeless proposition as far as treatment is concerned.

The percentage mortality on each garden is shown in table I.

It is evident from this table that there was no lessening in mortality late in the epidemic as garden 13, the last in which measles occurred, shows a heavy mortality from broncho-pneumonia. The total mortality from the epidemic was 2.23 per cent. Osler states that the usual mortality is from 2 to 3 per cent in private practice and from 6 to 10 per cent in hospitals. The low mortality is in striking contrast to the terribly fatal epidemic of measles in the Fiji Islands in 1875 when 40,000 deaths occurred in 150,000 cases within four months. From investigations in London, Stocks (1933) adduces evidence that epidemics are terminated by the development of temporary latent immunity in children.

Age incidence of deaths.—Table III shows age incidence of deaths and percentages at each age.

TABLE III

Age at death	Number of deaths	Percentage
Under 6 months ..	..	..
6-9 months ..	2	10.53
1-2 years ..	8	42.10
2-3 " ..	4	21.05
3-4 " ..	3	19.79
4-5 " ..	..	..
5-6 " ..	2	10.53
Above 7 " ..	..	..
TOTAL ..	19	100

The highest mortality occurred in the period from 1 year to 4 years and there were no deaths in children over 7 years or in the adults attacked. Severity of symptoms in adults was not noteworthy although this is a common superstition amongst Europeans.

Age incidence of measles.—The age incidence is given in detail in table IV. From this it will be evident that there is a relative immunity in young children up to six months old and even up to 1 year and that the heaviest incidence occurred in the age period between 1 year and 8 years.

This corresponds closely with epidemic figures in temperate climates. The small proportion of adult cases is striking in comparison with the severe epidemics in the Faroe and Fiji islands where unprotected adults of all ages were attacked. Relapses were not recorded during the epidemic.

Caste incidence

There was no evidence of caste immunity; all were equally affected.

Seasonal prevalence of measles in the East

Leonard Rogers gives the following distribution of measles in the European Hospital, Calcutta, during the three years 1904 to 1906.

January ..	25	July ..	2
February ..	24	August ..	7
March ..	49	September ..	4
April ..	31	October ..	4
May ..	12	November ..	13
June ..	5	December ..	19

TOTAL .. 195

Five-sixths of his cases occurred in the six cold weather months from November to April.

In the present epidemic, the seasonal prevalence is shown in table V.

TABLE IV

Number of gardens	CHILDREN															Adults .	TOTAL
	Months				Years												
	3	6	9	12	2	3	4	5	6	7	8	9	10	11	12		
1	..	..	1	1	..	1	..	1	..	..	1	..	..	..	..	..	5
2	3	3	4	2	24	25	15	11	9	4	6	6	3	3	2	5	125
3	1	2	4	..	25	41	32	40	28	38	17	5	1	9	..	8	251
4	1	1	4	3	8	10	7	15	6	13	6	3	7	3	5	20	112
5	..	1	3	3	11	6	10	2	8	..	7	..	4	1	..	2	58
6	..	..	2	4	6	9	6	2	3	3	2	2	..	..	1	9	49
7	..	1	5	2	20	7	3	6	2	..	3	5	..	..	..	6	60
8	..	..	..	..	1	..	..	3	..	1	..	..	..	..	..	..	5
9	2	2	2	..	2	5	7	3	3	..	4	1	..	3	..	3	37
10	..	..	2	3	19	5	15	9	14	8	7	1	5	..	1	7	96
11	..	..	..	..	3	4	1	5	2	4	..	..	..	..	..	2	21
12	..	..	..	..	3	2	1	..	1	..	..	..	..	..	..	..	7
13	..	..	..	4	1	2	5	..	4	1	4	..	3	..	1	2	27
GRAND TOTAL	7	10	27	22	123	117	102	97	80	72	57	23	23	19	10	64	853

TABLE V

Incidence month by month

Incidence month by month													
Number of gardens	1934									1935		TOTALS	March*
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.		
1	1	3	..	..	..	..	..	..	..	..	1	5	nil.
2	..	2	39	56	26	2	81	30	..	..	..	125	nil.
3	11	129	64	47	1	..	..	251	nil.
4	6	25	16	11	..	112	nil.
5	11	36	2	..	58	nil.
6	12	13	25	10	49	nil.
7	1	2	2	..	60	2
8	9	23	5	..	5	nil.
9	2	1	39	54	37	85
10	11	10	..	96	nil.
11	7	..	21	nil.
12	4	23	7	31
13	27	..
TOTAL ..	1	5	39	56	37	131	151	137	103	105	88	853	118

* This column has been added since the paper was written.

In the present series 552 cases out of 853 occurred between November and April, a percentage of nearly 65.

It will be seen that the heaviest incidence occurred from September to March and that many cases occurred in the relatively hot months of September and October. Judging from the present figures, and from those of two smaller epidemics in 1928 and 1930, the lowest incidence of measles in Assam occurs in the spring quarter, April to June. Most epidemics seem to commence late in May or early in June, and the appearance of definitely cold weather does not limit the prevalence of the disease.

Clinical observations

Average duration of rash.—This was 3 to 8 days throughout the whole series.

Koplik's spots.—These were found in 67.4 per cent of all cases.

Type of desquamation.—This was the usual fine, branny type, except in 8 cases which showed large flaky desquamation.

Presence of rash.—Rash was present in all cases excepting 7 in which the general symptoms were very severe and in all of which diarrhoea was very troublesome.

Blood picture.—Leucopenia was present in all cases examined and in 100 cases examined by the Tallqvist method there was a development of progressive anaemia, which rapidly disappeared on convalescence.

Stancanelli (1934) found a diminution of haemoglobin and red blood cells in the prodromal stage with an increase in leucocytes in the eruptive stage. He found a shift of the Arneth scheme to the left in the eruptive stage and during complications.

In the present series, the following Arneth count was made in four cases:—

ARNETH COUNT OF MEASLES CASES AT CINNAMARA. 1-2-35

Case number	1	2	3	4	5 lobes	Index
1	70	28	2	0	0	99
2	82	16	2	0	0	99
3	78	20	2	0	0	99
4	89	9	2	0	0	99

Treatment

Treatment was carried out on general lines as regards routine treatment, but an attempt was made to test the efficacy of (a) amidopyrin, (b) intensive vitamin-A administration, and (c) the effect of prophylactic convalescent serum, in limiting the spread of the epidemic.

Amidopyrin.—Collier (1930) recommended the use of this drug, which had been previously tried by Loewenthal (1924) in measles. He used pyramidon in powder given at four-hourly intervals during the day and night. The dosage recommended was 15 grains per adult with the usual formula dosage for children according to

age; the doses given were 2 to 5 grains. He claimed a specific action for this drug and an absence of complications with this treatment has been reported by further observers. Other clinicians advocated a smaller dose of 1 grain per year of age with a maximum of 4½ grains, given four-hourly.

In the present epidemic, and in a former epidemic on garden 1 in 1930, amidopyrin was used in the doses recommended by the above observer, but they were found to be far too large for safety in coolie children. The effects were generally beneficial, but cases of collapse occurred with the larger doses and the treatment was modified to a dosage of gr. i thrice daily for children up to 6 months and grs. ii for children from 2 to 5 years, with proportionate doses for older children.

Reports of my assistants on the efficacy of the drug varied. In some cases the results seemed favourable and the duration of the febrile period was shortened. In others there was no diminution in the average febrile period. In no case was the incidence of complications affected by the dosages used. In some cases, the temperature fell more rapidly than usual but there was a greater tendency to the development of diarrhoea in such cases. It may possibly be that the dosage used was too small, but an increase seemed to be contraindicated in view of the collapse symptoms which followed the larger doses.

Recently, a further disadvantage of this drug has been disclosed by the publication of cases treated with amidopyrin which have developed agranulocytosis. On the other hand, the compound powder, acetyl-salicylic acid—5 grains, compound powder of ipecacuanha—2½ grains, and phenacetin—2½ grains, was more efficacious, it lessened the urgency of symptoms and also complications in a series of cases in which it was tried. These amounts were used for adults and proportionate doses for young children thrice daily.

Atebrin.—This was given in one case which showed malarial infection and a considerable amelioration of the general symptoms was observed. Subsequently atebrin was tried in a further series of 8 cases without malaria, and again there was a definite improvement in the symptoms with decrease in temperature. None of these cases developed complications. This series is too small to be conclusive, but this drug certainly merits a further trial; the results were distinctly encouraging.

Omnadin.—Five cases were treated with omnadin 1 c.c.m. by injection daily for 3 days, and showed a reduction in temperature with no complications ensuing. The series is again too small for conclusive results but the improvement in symptoms warrants a more extensive trial of this compound.

Vitamin A.—On garden 2, cod-liver oil in emulsion was given to all cases, and, in addition, as a prophylactic to all children in the

lines. The dose used was equivalent to 5i to 5vi of cod-liver oil daily for children from 1 year to 12 years according to age. The percentage of infection in this garden to total population was 18 and the percentage of complications, which were very slight, was 18.75. The results were distinctly beneficial. Diarrhoea and colitis were not affected unfavourably by this mode of treatment. The number of cases treated was 112 and the number of line children was 200. There was only one death, the death rate being only 0.89 per cent. Vitamin-A treatment did not limit the spread of the disease, but it appeared to reduce the severity of complications and consequently the death rate.

Prophylactic serum.—On garden 2, which was visited early in the epidemic, there were 125 cases of measles out of a total population of 984 which included 365 children under 12 years of age. As this garden had no history of epidemic measles within 14 years, the presumption was that the disease was likely to run completely through the lines. It was therefore decided to try the use of prophylactic convalescent serum. Osler and McCrae recommend serum from cases which have had a normal temperature for 5 to 10 days in doses of 2.5 c.cm. for 4 days and 4 c.cm. on the 5th and 6th days.

Orvosi more recently recommends 3 to 10 c.cm. of serum collected 6 to 8 days after defervescence. Recently, 2 to 3 c.cm. on 3 consecutive days has been advocated. The larger doses seem contraindicated and the smaller seemed to act well. There were no adverse symptoms following injection and no complaints of pain or subsequent fever. Serum was obtained from measles cases which had been convalescent for 7 or 8 days. The dosage used was 3 to 5 c.cm. by intramuscular injection according to age. Each batch of serum was collected, tested for sterility and, in every batch, a preliminary Kahn test was made to prevent the possibility of the transmission of syphilis. The results were distinctly good. Out of 185 cases inoculated, only 5 developed measles, two of these within 2 days of inoculation.

It is almost a certainty that, had this prophylactic serum not been used, the number of cases would have been much larger. This is borne out on considering the results in garden 3, which followed with a record of 251 cases of measles amongst a population of 350 children. This garden population was not protected by prophylactic convalescent serum. Here the percentage of measles cases to total child population was 70 per cent, as against 33 per cent on the garden where convalescent serum was exhibited. The initial immunity in each garden was presumably the same and segregation was carried out on closely similar lines in both instances.

(Continued at foot of next column)

A NOTE ON AN EPIDEMIC OF CEREBROSPINAL FEVER IN A CLOSED COMMUNITY

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and

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Historical.—It is over half a century ago that Vandyke Carter, while engaged in his studies on relapsing fever in Bombay, described four cases of cerebrospinal fever in this country. Dimmock recognized the disease in epidemic form amongst the convicts of Shikarpur gaol during the winter of 1883-84. It is, however, surprising that since that time very little literature has appeared on the subject in India. In fact, it seems that this disease has somehow failed to engage the serious attention of the profession. Practically all the recorded outbreaks of cerebrospinal fever are in gaols

(Continued from previous column)

Summary

An account is given of a measles epidemic in Assam with tables of incidence, mortality, and seasonal incidence.

The effects of amidopyrin, vitamin A, atebirin and omnadin in treatment are discussed.

A note is given on the efficacy of convalescent serum as a prophylactic measure.

Conclusion

Measles in the tropics follows closely the type of the disease in temperate climates with a greater seasonal distribution in the hot weather months.

The use of cod-liver oil in treatment and of convalescent serum in prophylaxis is strongly advised.

Acknowledgments

I have to thank Dr. C. R. Das Gupta, of the Calcutta School of Tropical Medicine, for carrying out the Arneeth counts, and to Dr. L. R. Dey, Cinnamara Central Laboratory, for his help in preparing the statistics.

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and army barracks, where, on account of the comparatively closed nature of the community, high case mortality and dramatically sudden fatality, even a few cases of meningitis attract the immediate attention of the authorities. Moreover, the greater facilities for diagnosis available for these institutions soon reveal the true nature of the disease. On the other hand, factors, such as its irregular distribution both in space and time, and lack of laboratory facilities or neglect on the part of medical practitioners to use laboratory methods for diagnosis, would seem to suggest that the paucity of records of cases of cerebrospinal fever may not necessarily indicate that the disease is limited to institutions and that the civil population is to be regarded as free from the disease.

In our own province previous to 1920 no records of the occurrence of cerebrospinal fever are available. In that year, however, thirteen cases were admitted into the Mayo Hospital, Lahore. All of them were Kashmiri Moham-medans who had come from Jammu State. During the decade, 1921 to 1931, a few sporadic cases of cerebrospinal fever were occasionally reported from Ambala Brigade area, Rawalpindi, Lahore and Multan cantonments, but no outbreak of any importance occurred during that period.

The present outbreak.—In March 1932, however, an epidemic of cerebrospinal fever occurred in the Borstal Institution at Lahore. During the course of this epidemic which covered a period of about two years small outbreaks with intervening quiescent periods continued to occur. The first two cases were reported on the 12th of March 1932. Altogether 27 cases and 11 deaths were reported up to 15th November, 1933. The distribution of cases by months is shown in table I.

TABLE I

Incidence of cases of cerebrospinal fever by months, 1932-33

1932			1933		
March	..	13	January	..	1
April	..	3	February	..	1
June	..	2	October	..	1
August	..	3			
September	..	1			
November	..	2			

The first two cases were reported from the kitchen and thereafter from different circles and barracks. The distribution of cases by residence is shown in table II.

TABLE II
Distribution of cases by residence

Residence	Number of cases	Residence	Number of cases
Kitchen ..	6	Association barracks	4
Circle I ..	5	Official barracks ..	4
Circle II ..	3	Dobara ahata ..	1
Circle III ..	1	New Borstal kitchen	1
Circle IV ..	2		
TOTAL ..		27	

The distribution of cases according to occupations is shown in table III.

TABLE III
Distribution of cases by occupations

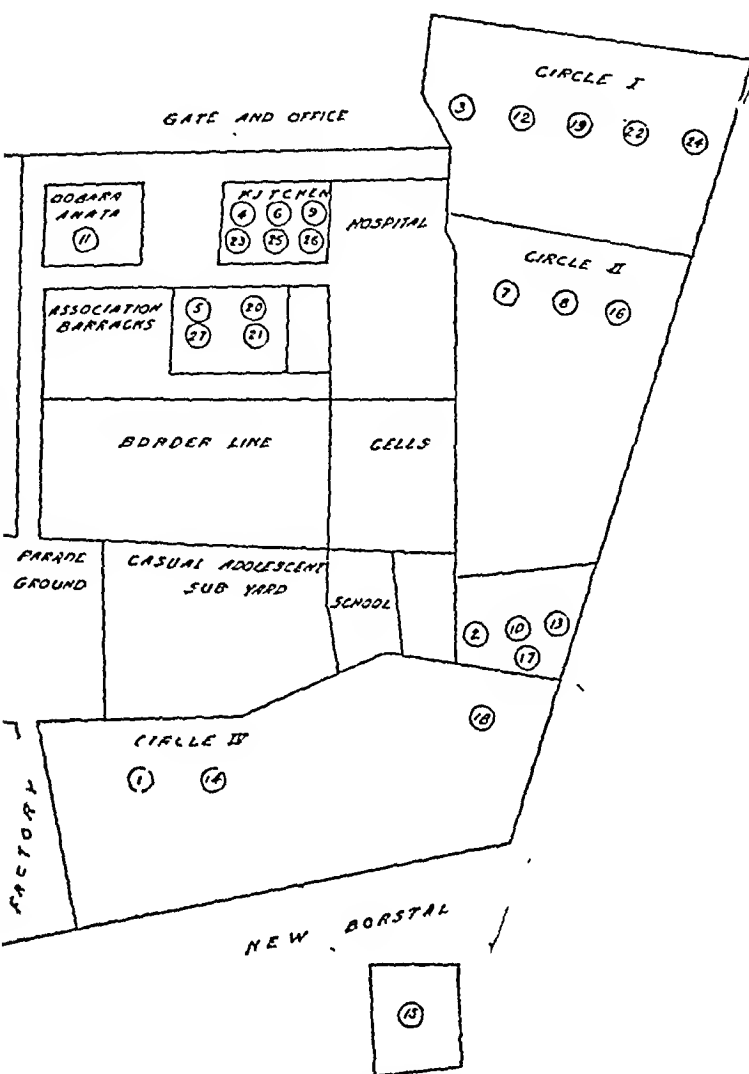
Occupation	Number of cases	Occupation	Number of cases
Cooks ..	6	Leather worker	1
Hospital attendants ..	2	Pressman ..	1
Carpenters ..	5	Dhobi ..	1
Blacksmith ..	1	Grain worker	1
Chick makers ..	2	Gardener ..	1
Textile workers	2	Miscellaneous	3
Tailor ..	1		
TOTAL ..		27	

The distribution of cases is also shown in the sketch map of the institution.

It will be seen that the largest number of cases was reported from the kitchen and circle I, i.e., 6 and 5 respectively, out of a total of 27 cases. It will further be noticed on reference to table V that the carrier rate was also subsequently found to be the highest in these two localities, i.e., 52.63 per cent in circle I, and 20.00 per cent in the kitchen.

The Borstal Institution is a provincial gaol, primarily meant for adolescent and juvenile offenders below 25 years of age. Accommodation is provided for 1,705 prisoners, 350 of whom are lodged in barracks and the rest are individually locked up in cells. High walls divide the residential portion of the gaol area into a number of enclosures known as circles. In each circle there are a number of two-storied buildings, each floor of which consists of a double row of cells set side to side and back to back. The individual cell which provides accommodation for a single prisoner is a room 15 by 8 feet, with an iron grating door $7\frac{1}{2}$ by $2\frac{1}{2}$ feet, and a ventilator $2\frac{1}{2}$ by $2\frac{1}{2}$ feet. The prisoners are locked in at sunset and are let out at sunrise into the big compound of the circle, where common latrine accommodation is provided. The inmates of the cells in each circle have thus an opportunity of mixing together for about half an hour in the morning and half an

hour in the evening, when they are collected together before being locked up for the night. Most of the prisoners have to spend about eight hours in the factories, all located in one big



Sketch map of Borstal Institution, Lahore. Distribution of cases of cerebrospinal fever in chronological order.

Cases	Date of occurrence	Cases	Date of occurrence
1	2- 3-32	15	13- 4-32
2	5- 3-32	16	13- 4-32
3	11- 3-32	17	24- 5-32
4	13- 3-32	18	14- 6-32
5	13- 3-32	19	25- 8-32
6	13- 3-32	20	25- 8-32
7	14- 3-32	21	25- 8-32
8	19- 3-32	22	13- 9-32
9	20- 3-32	23	2-12-32
10	21- 3-32	24	7-12-32
11	27- 3-32	25	19- 1-33
12	29- 3-32	26	9- 2-33
13	31- 3-32	27	3-10-33
14	13- 4-32		

compound. The sheds in which the prisoners work are all well ventilated and well lighted and on an average sixty square feet of space is provided for each person, though in practice they usually crowd up together for work. Besides the hours of work, the prisoners also closely associate with each other at the school and in the play ground. Some of the inmates

are put on special duties, e.g., cooks in the kitchens, attendants in the hospital, storekeepers in stores. They take their residence in the barracks situated near their place of work. A certain percentage of the men are on outdoor duty in the garden or on watch at night.

The gaol population at the time of the outbreak was 1,721, but during the preceding four months it had ranged between 1,800 and 2,489, that is to say the institution was overcrowded.

About the middle of November 1931, as a result of the Ahrar movement, large numbers of prisoners were received into the institution from various camp gaols in Jammu and Kashmir State. Some of these prisoners mentioned the occurrence of a somewhat similar illness in the Kashmir gaols.

Small as the number of cases appears, the persistence of the disease seriously dislocated the work of the institution, and, in order to avert the danger of a serious epidemic and to arrest its progress, help and advice of the public health authorities was sought by the gaol department. The preventive measures adopted to suppress the outbreak have already been dealt with in another communication by Chopra and Chadha (1933).

It is proposed to discuss here the bacteriological and epidemiological investigation carried out in connection with these measures.

The detection of carriers.—For the rapid detection of likely carriers, smears from the nasopharynx of 1,268 inmates were examined microscopically in March 1932, and about 20 per cent showed organisms morphologically indistinguishable from the meningococcus. The heaviest infection rate—65.6 per cent—was found in the kitchen. Towards the end of November a cultural examination was started. Nasopharyngeal swabs of 277 contacts were examined. As a result of this procedure 12 carriers were detected and isolated. In view, however, of the general epidemiological behaviour of the disease and the experience gained during the past year it was apprehended that the carriers of the meningococcus might not be confined to the 277 contacts already examined, but might be distributed throughout the population of the institution. Thus, there was a potential danger of an epidemic flaring up owing to a disturbance of the equilibrium of herd immunity, if a large number of admissions of non-immunes were made into a population containing many carriers, and the new-comers were allowed to mix with the existing gaol population. It was, therefore, decided that repeated swab examination of all the inmates of the institution, 835 in number, should be made by cultural methods. For this purpose, the gaol population was divided into groups according to their association at work and examination of one group was completed before proceeding with the other groups.

It was also planned that fresh admissions, which were to be made in batches of fifty,

should not be allowed until all the inmates had been examined and carriers isolated. Each fresh batch was to be quarantined for a fortnight and examined for carriers before admission into the general population of the gaol. Thus the number of prisoners examined up to 15th November, 1933, was 2,222 of whom 1,387 were fresh admissions.

Laboratory procedure.—*Neisseria meningitidis* is admittedly one of the most difficult organisms to deal with. The isolation of this organism specially when one is suddenly called upon to examine a large number of persons with as little delay as possible demands considerable forethought in devising a simple and efficient laboratory procedure and in organizing the work. As a similar situation may possibly arise elsewhere, we propose to describe the laboratory procedure adopted by us in some detail.

The workers were divided into four groups, each group having its own limited responsibilities and sphere of activity.

GROUP I.—MEDIA SECTION

Media used.—The medium found most satisfactory during the course of this investigation was blood agar prepared from sheep's blood. The blood used was etherized thrice on three successive days and was added to melted agar at 50°C. in a proportion of 5 per cent.

Dorset's egg medium was used for a short period for sub-culturing isolated strains of meningococci and keeping them in stock. We have not, however, found it in any way superior to the other media used. Growth on this medium was often meagre and did not last long.

Serum sugars.—During the early stages of the investigation liquid sugars were used. Subsequently, their use was given up in favour of a solid medium, consisting of serum agar containing 1 per cent of the carbohydrate. The latter gave more clear-cut and consistent results. Another great advantage was the ease with which contamination could be detected. It also appeared that the organisms of the genus *Neisseria* had a longer lease of life on solid sugars. Subcultures from liquid sugars were rarely successful after the fourth day, whereas in the majority of cases they were successful in the case of solid sugars up to the seventh day. It seems that autolysis occurs easily in liquid media.

GROUP II.—COLLECTION OF MATERIAL

A batch of fifty inmates was examined at a time. Three throat swabs of each prisoner were taken on consecutive days. West's swabs were employed for touching the nasopharynx, so as to avoid the injurious effect of the saliva on the growth of the organisms. Blood agar plates which had previously been warmed were lightly touched with the swab in one corner and the inoculum was spread on the rest of the surface by means of a platinum loop. The inoculated plates were immediately returned to a portable incubator and brought to the laboratory. Altogether 8,765 swabs were examined.

GROUP III.—PLATE EXAMINATION

Twenty-four hours' incubation was generally enough to enable us to recognize the colonies of *N. meningitidis* which appeared as circular, blueish-grey, translucent, convex, typically lenticular colonies, about 0.5 to 1 mm. in diameter, with an entire edge. They had a butyrous consistency and were easily emulsifiable. After confirmation by microscopic examination the colonies were picked up and direct inoculation on

blood agar slopes was made. After 24 hours' incubation the growth was tested for purity and if found satisfactory was submitted to further tests.

GROUP IV.—CULTURAL EXAMINATION

Solid serum sugar slopes of glucose, maltose and sucrose agar and a blood agar slope were inoculated to test the biochemical and cultural properties.

BIOCHEMICAL REACTIONS

The sugars were incubated at 37°C. for about 6 days. Fermentation generally appeared in 24 to 96 hours, rarely longer. For purposes of confirmation sugar tests often had to be repeated. It was observed that, in practically all cases, the meningococci soon dissociated on sugar media into two types of colonies, viz,

- A small dew-drop-like discrete translucent colony with an entire edge. The organisms usually gave an indeterminate reaction with a Gram stain.
- A colony, which after 24 hours tended to increase in size, developed a yellowish tinge and became somewhat opaque. Organisms from this type of colony gave a more definite Gram-negative reaction.

GROWTH ON BLOOD AGAR AT ROOM TEMPERATURE AND GROWTH ON NUTRIENT AGAR

On agar slopes or blood agar kept at room temperature there was no growth or sometimes perhaps a slight film or a few nodules at the point of heavy inoculation.

Of 975 strains of Gram-negative cocci examined 160 gave typical cultural and fermentation reactions, i.e., acidity in glucose and maltose, no change in sucrose.

SEROLOGICAL TESTS

Agglutination tests were carried out with all the emulsifiable strains of Gram-negative cocci irrespective of their sugar reactions. Polyvalent therapeutic serum obtained from Burroughs Wellcome and Company was employed in dilutions of 1/50, 1/100, 1/200, and 1/50 normal horse serum and normal saline were used as controls.

Auto-agglutination was observed to be a very marked feature of the *Neisseria* group as a whole. One hundred and twenty-eight strains, in which sugar reactions were negative for meningococcus, showed well marked agglutination in all tubes including the horse serum control and in some cases the saline control as well. Twelve strains with sugar reactions of the meningococcus also reacted in a similar manner. The results of the agglutination reactions of 149 strains regarded as meningococci on the basis of biochemical and other tests are shown in table IV. Of these strains 40.3 per cent proved to be agglutinable with the polyvalent anti-meningococcal serum while 59.7 per cent were inagglutinable.

TABLE IV

Agglutination reactions of organisms with positive sugar reactions

Total examined	AGGLUTINATION			
	Positive			Negative
149	1/50	1/100	1/200	89
	5	32	23	
	60			
	40.3 per cent			59.7 per cent

CARRIER RATE

(a) *The original gaol population.*—One hundred and three persons out of 835 were declared carriers, giving a carrier rate of 12.33 per cent. The carrier rate according to residence and occupations is given in tables V and VI.

(b) *Fresh admissions.*—By 12th May, the examination of the original gaol population having been completed and carriers isolated, fresh admissions of prisoners in batches of fifty per week were started. These were kept in quarantine for a fortnight. Their nasopharyngeal swabs were examined thrice for the presence of the meningococcus, and those found free were admitted into the institution and accommodated in circle IV. Any carriers detected were isolated along with the other carriers in the institution in one section, where work was provided for them and they were not allowed to mix with the population declared free from infection. One thousand three hundred and eighty-seven prisoners were admitted into the institution and examined up to 15th November, 1933; of these 9 were found to be carrying the

TABLE V

Carrier rate by residence in the original population of the Borstal Institution, Lahore

Residence	Number examined	Number of carriers	Carrier rate
Kitchen	105	21	20.00
Circle I	38	20	52.63
Circle II	152	20	13.15
Circle III	106	5	4.71
Circle IV	180	9	5.00
Hospital	46	3	6.52
Association barracks ..	143	17	11.88
Border line	65	8	12.30
TOTAL ..	835	103	12.33

TABLE VI

Carrier rate by occupations in the original population of the Borstal Institution, Lahore

Occupation	Number examined	Number of carriers	Carrier rate
Cooks	105	21	20.00
Carpenters	79	20	25.32
Sweepers	4	2	50.00
Hospital attendants ..	46	3	6.52
Chick makers	45	8	17.78
Blacksmiths	38	4	10.53
Tailors	26	19	73.08
Pressmen	43	3	6.97
Night watchmen	149	12	8.05
Mochis (shoe-makers) ..	15	2	13.33
Weavers	35	6	17.14
Dyers	5	3	60.00
Miscellaneous	245	0	0.00
TOTAL ..	835	103	12.33

meningococcus and were declared as carriers, giving a carrier rate of 0.65 per cent.

Each carrier was examined weekly and was not declared free until six successive swabs were negative when he was permitted to mix with the free population.

Discussion.—It will be seen that the carrier rate amongst the original gaol population was 12.33 per cent, whereas amongst the fresh admissions it was only 0.65 per cent. It may be pointed out here that the fresh admissions consisted entirely of freshly-convicted persons and may, therefore, be regarded to a certain extent, as a sample of the civil population. Thus the carrier rate in the original population of the institution was about 19 times that of the fresh admissions.

A reference to table V shows that the carrier rate was highest in circle I and the kitchen, being 52.63 and 20.00 per cent, respectively. As regards the distribution of the carrier rate according to occupations the worst offenders would seem to be the tailors, dyers and sweepers, with carrier rates of 73.08 per cent, 60.0 per cent and 50.0 per cent respectively. No significance can, however, be attached to the high figures obtained in the case of dyers and sweepers, since the numbers actually examined are insignificant, being 5 and 4 respectively. Next in order are the carpenters and cooks with moderately high carrier rates, 25.2 and 20 per cent respectively. This is in accordance with expectations, since it will be observed on reference to tables II and III that the largest number of cases $5 + 6 = 11$ out of a total of 27 were also returned from these two groups. The high carrier rate amongst tailors, carpenters and cooks may to some extent be explained by the more intimate contact and conditions of overcrowding obtainable in the case of these groups, as compared with the other groups.

Summary

1. An outbreak of cerebrospinal fever occurred in the Borstal Institution, Lahore, during the years 1932 and 1933, resulting in 27 cases and 11 deaths. The infection was probably introduced by carriers amongst Ahrar prisoners transferred to the Borstal Institution from Kashmir and Jammu State gaols.

2. The largest number of cases, 6 and 5, occurred amongst the cooks and carpenters in the kitchen and circle I.

3. The bacteriological technique adopted during the course of the investigation is given. A solid serum sugar medium was found to be superior to a liquid medium for fermentation reactions. Eight thousand seven hundred and sixty-five nasopharyngeal swabs were examined by cultural methods for the detection of the meningococcus.

4. Of the original gaol population consisting of 835 inmates 103 were found to be carriers, giving a carrier rate of 12.33 per cent.

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CLINICAL OBSERVATIONS ON CEREBRO-SPINAL MENINGITIS IN INDORE

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DURING the first half of 1934, cerebrospinal meningitis was reported in epidemic form from several parts of India, Indore being one of them.

Forty cases of cerebrospinal meningitis were admitted to the Infectious Diseases Hospital, Indore, Holkar State, between March and June.

The following note is based on the observations made during the epidemic.

Epidemiology

Age.—The majority were between the ages of 15 and 30. Except for two cases of about 50 years of age, no case above 50 years of age was admitted. Only two children, aged about 5 years, were admitted.

Season.—The epidemic was at its highest during the months of April and May; it then subsided. [It has only since reappeared in November and sporadic cases are still occurring.]

Sex.—There were thirty-two males and eight females.

Environment and spread of the disease

The first case was imported from Ahmedabad. Before admission to the hospital, he was

(Continued from previous page)

5. Of 1,387 fresh admissions consisting of newly-convicted persons 9 were found to be carriers, giving a carrier rate of 0.65 per cent.

6. Carrier rate was found to be the highest in circle I and the kitchen, amongst the tailors, carpenters and cooks, the latter two groups also showing the incidence of the largest number of cases.

Acknowledgments

Our thanks are due to Khan Bahadur Dr. K. A. Rahman, O.B.E., Director of Public Health, Punjab, for kindly placing at our disposal the records in his office dealing with cerebrospinal fever in the Punjab. We are also greatly indebted to Drs. D. R. Mehta, M. A. Pirzada, Abdul Haq, T. S. Gill and Ghulam Rasool for assistance during the course of this investigation.

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kept at his house in Indore City for two days. The subsequent two or three cases came from the same or surrounding localities. None of the members of the families of the patients got the infection, except in one instance, when two cases occurred in the same family. The cases came from different localities of the city and were not confined to any single locality, nor community, but were mostly from amongst the poorer classes. Of the 40 cases, 4 were school boys, 3 cinema visitors and 3 mill-hands.

Schools, mills and places of entertainment were not closed.

Prophylaxis

None of the relatives attending on the patients got the infection. As a matter of routine, all of them were made to gargle twice a day with potassium permanganate solution. None of the hospital staff got the infection nor to the best of our knowledge did we act as carriers. Though we had no time for gargling as a rule, we invariably used the mouth-mask, when attending on these cases.

Symptomatology

To start with, the patients got catarrhal throat affections and in some cases they first got influenza-like symptoms and then the meningitic symptoms supervened. The commonest symptoms observed were fever, vomiting, continuous in the initial stage, severe headache, delirium, passing into coma and rigidity of neck.

Fever of an irregular type, sometimes touching the normal and then rising again to 102°F. or 104°F. Some of the patients died with hyperpyrexia.

Symptoms of intracranial tension:—Vomiting, mostly continuous in the initial stage, severe headache, delirium and coma.

Rigidity of neck:—The muscles of the back of the neck became stiff. The patient could not bend the head forwards nor could he move the head from side to side. As the disease progressed, the retraction of the neck became marked. The dorsal and lumbar muscles were in almost all cases similarly affected. In the worst of the cases, the back was arched with the concavity backwards and the legs were kept flexed. Pains frequently extended down to the muscles of the lower extremity.

Kernig's sign was usually present.

Hyperæsthesia, especially along the spine, and severe pain in the back were present in most of the cases.

Rash:—Purpuric spots were observed in a few cases.

Pulse:—The pulse frequency was not always proportionate to the degree of fever.

Inflammation of joints appeared, generally after a couple of days, in a few cases and then subsided without suppuration.

Cranial nerve implications were observed in a few cases such as pain in the ear, tinnitus and defective hearing, dilatation of the pupils and dimness of vision.

Herpes labialis was seen in a few cases.

Wasting:—In chronic cases there was marked wasting.

Cerebrospinal fluid:—On lumbar puncture, the cerebrospinal fluid was found to be turbid and in the worst cases it was purulent. It came out under pressure, its quantity generally reaching 30 to 40 c.cm. or even more and it contained meningococci.

The cases that recovered are not suffering from any permanent disability. Amongst the unfavourable signs are the occurrence of hyperpyrexia, irregular breathing and unduly prolonged period of illness.

Treatment

1. *Lumbar puncture*.—Lumbar puncture alone was found to be of value, as it helped in the draining of toxins and meningococci. For the first two or three days, it was done twice a day and then once a day, till the cerebrospinal fluid was clear and stopped coming out under pressure. In severe cases, where the cerebrospinal fluid was very thick, the cavity was gently washed with sterile normal saline solution.

2. *Serum*.—Polyvalent anti-meningococcal serum was given intrathecally in doses of 20 c.cm. or more, according to the severity of the case and the age of the patient. The serum was introduced into the spinal canal very slowly and on the slightest sign of shock the injection was stopped at once and the shock was treated with injections of adrenalin chloride solution. The amount of serum given was always less than the cerebrospinal fluid drawn, by about 5 to 10 c.cm. for fear of increasing the intracranial tension. If the cerebrospinal fluid withdrawn was not sufficient to permit the full dose of the serum being given intrathecally, the serum was given partly intrathecally and partly intravenously to make up the full dose. The foot of the bed was raised to allow the serum to run to the brain. The serum injection was repeated every day till the symptoms subsided, the cerebrospinal fluid was clear and the meningococci had disappeared therefrom. To lessen the risk of relapse, which occurred in a few cases, one or two additional doses of the serum were given after the meningococci had disappeared from the cerebrospinal fluid. The earlier the serum is given, the better are the results obtained. We mostly used serum from the Bengal Immunity and Bengal Chemical and Pharmaceutical Works.

3. *Soamin injections*.—Intramuscular injections of soamin solution in 1 grain doses were given on alternate days during the acute stage, guarding against gastric irritation and dimness

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NEPHROSIS: ITS NATURE AND INCIDENCE IN INDIANS

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NEPHROSES in general include all forms of degenerative types of Bright's disease. Nephroses are classified as follows:—

1. Primary or chronic or lipoid nephrosis.
2. Secondary nephroses.
- (a) Larval nephroses occurring in fever, early diabetes, anæmia and Graves' disease.

(Continued from previous column)

of vision. It is doubtful if this did any good.

4. *Sedatives*.—To induce sleep and give relief from severe headache and pain, potassium bromide gr. xx and chloral hydrate gr. x were given with very satisfactory results, the potassium bromide being repeated, if necessary.

5. *Nutrition*.—Plenty of nourishment by mouth, such as milk, fruit juice, eggs and glucose water, were given at frequent intervals.

6. *Urotropine*.—Urotropine, given by mouth as well as by intravenous injections, has been found of little value.

Mortality.—Of the 40 cases treated at the hospital, 10 died, the mortality rate thus being 25 per cent.

Conclusions

For some years past, a few cases of this disease have been detected each year in Indore City.

During the period under review, there was undoubtedly an epidemic, but it is equally certain that some of the cases would have gone undetected or been diagnosed as something else, if it had not been for the special precautions taken owing to the prevalence of the disease at Ahmedabad and elsewhere.

Our experience here shows the disease is not contagious and that there is no proof of the theory of dissemination by carriers. The mills, schools and places of public meeting were not closed and there was no evidence that persons frequenting such places or following any particular occupation were specially attacked.

The indications are more that the germs are present in persons' throats without doing them any harm, until certain favourable conditions arise, one of these being an influenza-like catarrh.

Although most of the cases occurred amongst the poorer classes, some rich persons were also affected.

There was a marked predominance amongst young adult males.

[It is not at all clear on what evidence the authors base their somewhat unusual and apparently-contradictory conclusions regarding the ætiology of the disease.—EDITOR, I.M.G.]

- (b) Necrotizing nephroses occurring in acute chemical poisoning (e.g., mercury).
- (c) Amyloid nephrosis as a part of a generalized amyloid disease.
- (d) Nephrotic changes occurring in the definitely inflammatory group of Bright's disease.
- (e) Pregnancy nephrosis.

The nephrotic syndrome is characterized by slight anaemia, marked oedema, copious albuminuria, good kidney function, absence of haematuria, normal or low blood pressure, no retinal changes, markedly reduced blood proteins, reversed albumin-globulin ratio, normal blood urea, high blood cholesterol, doubly-refractile lipoids in urine, and large white kidneys showing degenerative changes but with no fibrosis.

The essential pathology is a degenerative change in the tubules (and to some extent in glomeruli too) and deposit of lipid material. Some replacement fibrosis may occur and Vollhard has even described a nephrotic contracted kidney. Damage to the kidney results in copious albuminuria and it has been definitely shown by bleeding animals that nephrotic oedema and hyper-cholesterolaemia are due to depleted blood proteins. Blum and Caulaert have shown that oedema is due to the retention of sodium ions, and that ingestion of sodium should be restricted in these cases.

Larval, necrotizing and amyloid nephroses are often met with. Cases of chronic nephritis with low blood pressure and good kidney function were commonly observed in the wards of the King George's Hospital. Were these nephrotic syndromes of the primary nephrosis type or did they only denote secondary nephrotic changes in chronic Bright's disease? In order to get some insight into these problems I made observations on the chemical and biochemical features of 25 cases, and consulted the old records of 75 cases of nephritis.

Analysis.—I found that 70 per cent of the cases occurred between the ages of 20 to 40 years, and that 90 per cent of them were males. The outstanding clinical features were pallor and oedema. Malaria, ankylostomiasis and dysentery generally preceded an insidious onset. About 50 per cent of the cases had a normal blood pressure. Oliguria was present in all cases. Hyaline and granular casts were generally present. Though red blood cells were present in some of the urines, frank haematuria was neither observed nor was there any history of it.

The serum had a milky appearance in 40 per cent, probably due to the presence of a lipid-globulin compound. The serum proteins were diminished from 20 to 50 per cent. The albumin-globulin ratio was reversed in 40 per cent of cases. The serum chlorides were increased from 5 to 20 per cent. The serum cholesterol was increased in 70 per cent of the cases; this varied from 180 to 350 mgms. per 100 c.cm., but in one case it rose up to 900 mgms. Blood urea

was normal in 50 per cent. Kidney function was good in 25 per cent when judged by the specific gravity test, but in 35 per cent when judged by the urea concentration test.

A vigorous treatment with saline purgatives, alkaline diuretics, a salt-free diet and other physical measures usually reduced the weight by several stone, and the patients were apparently cured after a few weeks' treatment. As judged by the urea concentration test their kidney function did not improve and the relieved patients were very likely to revert back to their original condition. Only 17 post-mortem reports on nephritis cases were available and all showed signs of chronic inflammation.

Discussion.—The above observations showed that, though a complete picture of the nephrotic syndrome was not observed, partially nephrotic pictures are quite common and practically constitute the predominant type. Cases which at first sight presented a picture of chronic nephrosis invariably turned out on closer examination to be cases of chronic glomerulonephritis in which secondary nephrotic changes had set in. Sometimes, it must be admitted, it is impossible to distinguish between chronic nephrosis and nephrotic type of glomerulonephritis by clinical and biochemical tests. Very often only a microscopic examination of the kidney section revealed the true inflammatory nature of the disease which during life was thought to be of the degenerative type. That is why some writers doubt the very existence of a primary nephrotic condition. However, it is safe to say that primary, chronic or lipid nephrosis is as rare here as it is in Europe and in other countries.

As regards the aetiology of chronic nephrosis it is veiled in obscurity in a large proportion of cases. Some are said to be due to chronic infections. The predominance of nephrotic changes in Indians is probably due to the fact that nephritis in the large majority of cases is of insidious onset; and as a history of malaria, dysentery and ankylostomiasis preceding the onset of the disease is present in most of them, it is quite probable that their toxins may start, not only a chronic inflammation but also, concomitant degenerative changes in the kidneys.

Pregnancy nephrosis.—Toxaemias of pregnancy are quite common in Indians and do not differ in any particular way from those observed in other countries. 'Pregnancy nephrosis', as Cruickshank puts it, 'is seldom seen in pure form, however, being frequently accompanied by acute, sub-acute, or chronic nephritis'. But according to Fishberg 'certain clinical characteristics, notably the frequently extreme hypertension, separate it distinctly from the picture of nephroses as encountered in the non-pregnant state, so that it seems more judicious to retain for the present the non-committal term "kidney of pregnancy"'.
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CLINICAL EVIDENCE OF RHEUMATIC FEVER IN THE PUNJAB

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THE existence of rheumatic fever in the tropics has always been a disputed point. Its prevalence even in a sub-tropical climate like that of the Punjab has been looked upon with suspicion. Hughes and Yusuf (1930 and 1931) have presented some evidence in support

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The kidney of pregnancy shows changes of degenerative type only. Though these have been attributed to toxæmia of pregnancy the actual existence of a toxin in pregnancy has not been proved. Volhard's angiospastic view seems to explain the facts better. According to him the kidney changes are purely of ischæmic degeneration—a local manifestation of a generalized angiospasm. The recent studies of Hoffman and Anselmino in the endocrine changes in pregnancy give a clue to the cause of this angiospasm. They have shown that in the last months of pregnancy there is a hypersecretion of the posterior lobe of the pituitary and especially of the oxytocic principle; but in cases of toxæmia of pregnancy vasopressine constitutes most of the pituitary secretion, and it naturally leads to an angiospastic condition. Even an eclamptic condition has been produced in animals by injection of strong doses of vasopressine.

The appearance of œdema in this condition is also explainable in terms of pituitary disturbance. The temporary hyperpituitarism leads to a retention of water and consequent œdema. Diabetes insipidus is a manifestation of the hypo-disturbance of the same water-controlling mechanism as conceived by Elwyn. In cases which are associated with glomerulonephritis the œdema may have a nephrotic or rarely nephritic element too.

Summary

Classification, the main characteristics, and a brief pathology of nephrosis is given. The author's experience has been summarized. Though partially nephrotic pictures in cases of chronic glomerulonephritis are quite common, primary nephrosis was not observed. A plausible hypothesis for pregnancy nephrosis has been discussed.

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of the existence of rheumatic fever in the Punjab. They came to the conclusion that lesions of the heart, especially those of the mitral valve, often bear an ætiological relationship to a disease which in certain respects resembles the rheumatic fever of temperate climates. They described this disease to be a subacute affection of the various joints involving almost all the joints of the body with slight febrile disturbances though in some cases the disease may be more acute.

In the latter part of 1932, a controversy was carried on in the *British Medical Journal* in which the existence of rheumatic fever in the tropics and particularly in the Punjab was disputed. It was contended that, as mitral disease and chorea were rare diseases in the tropics, the diagnosis of the reported cases of rheumatic fever was questionable. Colonel Keates with his 25 years' experience in the Punjab maintained that rheumatic fever was practically non-existent among the indigenous population. He saw only 3 or 4 cases in 25 years and those only in town people. He never saw a case of primary disease of the mitral valve. Aortic disease due to syphilis in his opinion was quite common. He never saw an inflamed mitral valve in 600 post-mortem examinations done at Amritsar, though diseased aortic valves were commonly seen.

Colonel Hughes who took part in that correspondence was, however, of the opposite opinion. He based his conclusions on his experience in the Mayo Hospital. In his opinion rheumatic fever was by no means uncommon among the indigenous population of the province, and mitral disease was a frequent result of rheumatic infection. The arthritic manifestations in his opinion were usually subacute or mild, although typical rheumatic fever sometimes occurred. His enquiries from the Mayo Hospital pathologist gave him the information that mitral disease had been met with 7 times in 200 consecutive necropsies.

My attention to this subject was aroused by a case which I saw when posted at a dispensary in Attock district in 1932. A boy aged ten was brought to the outpatients' department suffering from pains in the limbs occasionally for the past 3 months or so and an occasional rise of temperature up to 99°F. or 100°F. The child was anæmic and weak. The heart seemed to be quite normal at this stage. He was put on salicylates and the pains stopped. The parents discontinued the treatment and the pains and other symptoms reappeared. The child was brought to the outpatients' department off and on for 2 months. Then on routine examination of the heart I noticed that the first sound was not quite clear. I advised admission of the boy into the hospital, but the parents refused to get him admitted and so the child was treated as an outpatient. A few days afterwards, however, the child began to get a high temperature and various joints got swollen.

At this stage they consented to allow the child to be admitted to hospital. The temperature now ranged between 102°F. to 103°F. and was of the continuous type. The apex beat became diffuse and tumultuous. The first sound became rough and a systolic murmur appeared in the mitral area. The second pulmonary sound became accentuated and sharp. Subcutaneous nodules, two on the forehead and one on the hand, also appeared. The child was put on high doses of salicylates. The swellings and pains in the joints subsided but the temperature, though it came down a little, was not completely controlled. The child remained in the hospital for about 2 weeks, but as there was no marked improvement he was taken away against my advice and died about a month afterwards.

Since the beginning of 1934 I have been collecting cases of rheumatic infection from the medical outpatient department of the Mayo

Hospital. Thirty cases in all have been recorded. They are by no means all the cases of rheumatic infection that attended the medical outpatient department during this period, as there must have been many others attended to by the other physicians. The histories taken included the symptoms which the patient came suffering from, the clinical examination, family history, the status of the patient and the locality from which he came. No electrocardiographic or x-ray examinations could be done as the cases recorded are from the outpatients' department.

Out of these thirty cases recorded, there were ten of simple articular rheumatism, fifteen showed an involvement of the mitral valve, and five patients were suffering from chorea.

Tables I, II and III show an analysis of the cases belonging to these three groups:—

TABLE I
Simple articular cases

Serial number	Religion and sex	Age in years	Important symptoms	Duration of illness	Type of disease
1	M. F.	9	High fever, acute pains and swelling of different joints. One subcutaneous nodule.	7 days.	Acute rheumatic fever.
2	S. M.	15	Fleeting pains in the joints off and on.	2 years.	Pains due to rheumatic infection.
3	M. M.	9	Pains in different joints. An occasional swelling of the ankles with slight fever.	2 months.	Rheumatic fever, subacute.
4	M. M.	16	High fever. Fleeting pains and swelling of different joints. Had a similar trouble 6 months previously.	1 month.	Acute rheumatic fever.
5	M. M.	16	Pains in the various joints and limbs. An occasional slight rise of temperature. Recurrent attacks of sore throat.	..	Pains due to rheumatic infection.
6	M. M.	10	Pains in the joints and extremities. Recurrent sore throat.	3 years.	Pains due to rheumatic infection.
7	M. M.	10	Pain and swelling of knees and then wrists. Temperature 100°F. Sore throat.	15 days.	Rheumatic fever, subacute.
8	M. M.	20	Pains and swelling of different joints. High temperature for 10 days and then low fever. History of sore throat.	1 month.	Do.
9	H. M.	17	Pains and swelling of different joints. High fever for 10 days and then a low fever.	1 month.	Do.
10	M. M.	6	Pains in various joints. Swelling of both ankles. Daily fever 100°F. Enlarged tonsils.	1 month.	Do.

M.=Mohammedan.

H.=Hindu.

S.=Sikh.

M.=Male.

F.=Female.

TABLE II
Cases showing an involvement of the heart

Serial number	Religion and sex	Age in years	Previous history	Type of cardiac lesion
1	M. F.	15	Pains and swelling of joints one year ago.	Mitral stenosis.
2	M. M.	25	Pains and swelling of various joints since childhood.	Do.
3	H. M.	40	Pains and swelling of different joints at the age of ten and again at the age of thirty.	Auricular fibrillation following mitral stenosis.
4	H. F.	7	Pains and swelling in different joints of 4 months' duration.	Double mitral disease.
5	H. M.	14	Pains in the limbs and joints of 5 years' duration.	Mitral stenosis.
6	H. M.	12	Fever, pain and swelling of the joints—15 days' duration.	Early rheumatic endocarditis of the mitral valve.
7	M. M.	22	Floating pains in different joints—5 years' duration.	Aortic regurgitation with mitral stenosis.
8	M. F.	25	Pains and swelling of joints off and on for the last 7 years.	Do.
9	M. F.	18	Recurrent attacks of pain in joints—8 years' duration.	Paroxysmal attack of auricular fibrillation due to mitral stenosis.
10	M. F.	45	Attacks of pain and swelling of joints since childhood.	Double mitral disease.
11	M. F.	24	Pains in the various joints and low fever 2 years ago.	Aortic regurgitation and mitral stenosis.
12	M. F.	25	Pains in different joints with occasional swelling of shoulder—duration one year.	Double mitral disease.
13	M. F.	38	Painful swelling of the joints at the age of 16 and again at the age of 22.	Mitral stenosis.
14	S. M.	11	Acute rheumatic fever 5 years ago.	Double mitral disease.
15	S. M.	40	Fever, pain and swelling of different joints—duration one month.	An early lesion of mitral valve.

TABLE III
Cases of chorea

Serial number	Religion and sex	Age in years	Previous history	Present condition
1	M. M.	7	Fever with pains and swelling of joints four months previously.	Irregular purposeless movements, inco-ordination and weakness of musculature.
2	C. M.	9	Pains in different joints three months previously.	Irregular movements, ataxia of movements and lack of power in the limbs.
3	M. F.	11	Pains in knees and extremities two years previously.	Irregular movements, ataxia and weakness of musculature.
4	C. F.	12	No history of rheumatic infection of the joints.	Irregular movements, ataxia and weakness of musculature.
5	M. M.	11	Fever with pain and swelling of different joints one month previously.	Irregular movements, weakness of muscles and inco-ordination of movements.

M.=Mohammedan.

H.=Hindu.

C.=Christian.

S.=Sikh.

M.=Male.

F.=Female.

It will be seen from the tables that the cases of simple articular rheumatic infection were mostly subacute in nature. All the fifteen cases in which the heart was involved showed a lesion of the mitral valve. Three of these mitral cases showed in addition a diseased aortic valve as well. All these heart cases gave a clear history of a previous attack of subacute or acute affection of the joints. There were five cases of chorea in the series. Four of them gave a definite history of having previously suffered from articular rheumatism. The fifth case may be taken as one in which chorea was the first symptom of rheumatic infection. Only one case in the series gave a history of rheumatic infection in other members of the family.

The cases came from the villages as well as the congested areas of the towns. Most of them were poor but that may be because the hospital attending population is mostly poor. The rheumatic infection of the joints occurred in a great majority when they were still young.

The following four case histories, one that of a case of acute rheumatic fever, the second that of a case of subacute rheumatic infection of the joints, the third that of a case showing cardiac involvement and the fourth that of a case of chorea, are described below in detail as typical examples of the cases belonging to the different groups:

Case 1.—H., a Mohammedan female child, aged 9 years, came in with high fever, temperature 103°F., duration 7 days, with acute pains in the various joints of a shifting nature and swelling of the wrists and ankles. There was one subcutaneous nodule behind the right elbow which was very painful. The heart was normal. The pulse rate was 120. There was no history of sore throat. One sister and her mother suffered from occasional pains in various joints. The patient came from a congested quarter of Lahore. Her father was poor.

Diagnosis.—Acute rheumatic fever with one subcutaneous nodule.

Case 2.—M. A., a Mohammedan male, 6 years of age, came in complaining of pains in the various joints of the body with a swelling of both the ankles and a daily rise of temperature every evening up to about 100°F. The complaint was of one month's duration. The child was anæmic. Pulse rate was 100. Tonsils were enlarged and congested. The size of the heart and its sounds were normal.

There was no family history of rheumatic fever. The child came from a congested quarter of Lahore and was of poor means.

Diagnosis.—rheumatic fever.

Case 3.—S. S., a Sikh male child, aged 11 years, complained of dyspnoea and palpitation of 5 years' duration which started after an attack of acute fever in which nearly all the joints got swollen and painful one after another. Since then he has been getting slight pains and swelling of different joints occasionally. The feet were œdematous and the liver enlarged. The apex beat was beyond the nipple line and diffuse in character. The first sound was roughened and was followed by a systolic murmur which was being conducted up to the angle of scapula. The second sound was accentuated and sharp. There was no family history of rheumatic fever. The child was brought from Rawalpindi and belonged to a well-to-do family.

Diagnosis.—Mitral disease of rheumatic origin.

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A SIMPLE TECHNIQUE FOR THE DETECTION OF SMALL TRACES OF CHLOROFORM IN VACCINE LYMPH

By K. S. SHAH, D.Sc., D.P.H.

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VACCINE lymph is a preparation of the substance obtained from the vesicles produced on the skin of healthy animals by inoculation of vaccinia virus. When collected from the vaccineifers, lymph is always found to be contaminated with extraneous micro-organisms, which should either be eliminated or considerably reduced before it can be issued for human vaccination.

The procedure necessary to bring the contents of bacteria and other visible micro-organisms within the prescribed limit varies in

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Case 4.—K. Z., a Mohammedan male, aged 7 years, came to the medical outdoor department showing irregular movements of all parts of the body with marked weakness of the limbs and inco-ordination. The patient had twice severely injured himself by sustaining falls. The arms when outstretched showed flexion at the wrist and extension at the fingers. When asked to protrude his tongue and then take it back, he would do it with a sudden jerk. The child was anæmic and looked emaciated. Pulse rate was 100 per minute. The heart was normal. Four months previously the child had suffered from an attack of fever in which he suffered from pains in all the joints and swelling of both wrists and ankles. The attack lasted for about a month. The child was treated for chorea on the usual lines with 5 grains of aspirin-given twice daily. The child showed a gradual improvement and in about one month made a complete recovery so far as the movements were concerned. The pains did not recur and the child showed a gradual improvement in his physical condition as well. The other brothers and sisters had no rheumatic history. The child lived in a congested area of Lahore. The father was a barber and had poor means of living.

Diagnosis.—Chorea with a rheumatic history.

Summary

1. Thirty cases of rheumatic infection have been studied.
2. The disease exists in all its forms, i.e., articular, cardiac and chorea.
3. The articular form of the disease is mostly subacute in nature.

For the above work I am deeply indebted to Lieutenant-Colonel D. H. Rai, I.M.S., Professor of Pharmacology, King Edward Medical College, Lahore. The work was taken up at his suggestion and was throughout done under his kind guidance.

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different countries. In Great Britain this limit is 5,000 organisms per c.cm. (*vide* Statutory Rules and Orders, 1931, No. 633, Therapeutic Substances, page 21), and is brought about by subjecting the lymph to a temperature of 15°C . for one week.

In the Anti-Toxin and Vaccine Laboratory Department of Public Health, Massachusetts, U. S. A., lymph is incubated at 37°C . for less than two hours, as exposure to heat brings about a rapid fall in the bacterial count.

In the Punjab Vaccine Institute, the same object is attained by passage of chloroform vapour through the lymph. As continued presence of chloroform in the lymph is detrimental to its potency, it is removed by passing filtered air through it after 24 hours. When chloroform can no longer be smelt from the 'exit tube' lymph is considered to be free of it. The 'smell test' has so far given satisfactory results. It is, however, open to certain objections. In the first place, the personal factor plays a great part, some persons having a more acute sense of smell than others. Secondly, very minute traces of chloroform cannot be detected by this method.

A simple technique has, therefore, been evolved, and is highly satisfactory. It is based on two factors:—

(1) Chloroform is soluble in alcohol.

(2) It gives a blue colour when brought in contact with a solution of β naphthol in strong solution of potassium hydroxide.

Procedure.—Take about 5 c.cm. of absolute alcohol in a glass test-tube.

2. Pass a current of air (supposed to contain traces of chloroform) through it for a few minutes.

3. Add about 2 c.cm. of a solution of β naphthol in a strong solution of potassium hydroxide.

4. Heat it to 50°C . in a water bath.

5. If chloroform is present a blue or greenish-blue colour will develop.

This method will be of considerable help in determining the time lymph should be subjected to aeration after chloroforming.

[*Note.*—We do not know whether this test has been applied hitherto for detecting traces of chloroform in vaccine lymph; the Guareschi-Lustgarten reaction was, however, described as long ago as 1872 (*Ber. d. deutsch. chem., Ges.*, V, 1053).—EDITOR, I.M.G.]

A Mirror of Hospital Practice

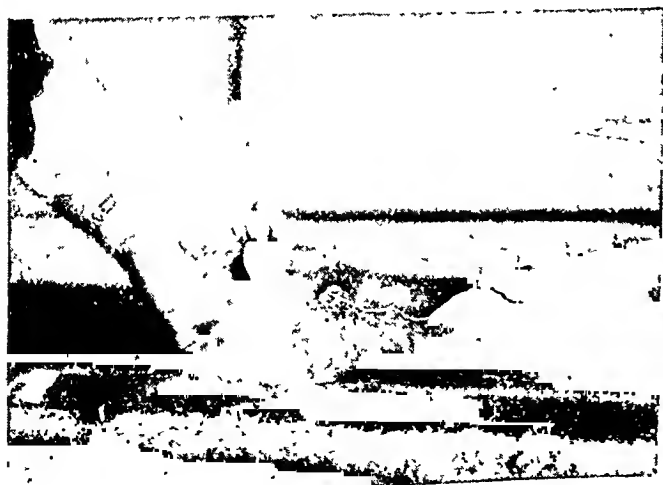
A CASE OF GUINEA-WORM INFECTION

By K. L. BASU MALLIK, M.B.

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C. N., a jute mill coolie, aged about 25 years, came to get his foot dressed with a worm sticking out to the length of about ten inches.

History.—He came to work in the Ludlow Jute Mills at Chengail about five months ago from his native place, Kumili in Vizagapatam. Two weeks ago



he had a painful blister below the right ankle which burst and refused to heal up. Then he noticed the white string-like worm emerging and came to the

dispensary for treatment. Two years ago two similar worms came out of his right leg below the knee joint and two scars are present indicating the sites. The worm was tied to a piece of matchstick and wound round it. The diagnosis was confirmed by Dr. Sundar Rao of the Calcutta School of Tropical Medicine.

The worm was being daily pulled out bit by bit for about five or six days, and during this time the patient suffered from no inconvenience such as fever or allergic manifestation and continued at his work. One day during the absence of the writer the dresser tore off the extruded portion of the worm and subsequently an area radiating from one lip of the initial ulcer became swollen and very tender. A director was passed and an incision was made to let the pus out. Four days later the end of the worm was visible in the wound and on slight and careful pulling the whole of the remaining portion came out measuring six inches. The end was tapering and the characteristic hook-like tail extremity was visible. This torn portion appeared to be alive and moved in water. After the last portion was out the wound began to clean up and it healed uneventfully in about eighteen days.

[*Note.*—Although this case is reported from Bengal the source of infection is obviously his native district in Vizagapatam. No authentic case of guinea-worm infection originating in Bengal has ever been recorded.—EDITOR, I.M.G.]

A CASE OF MALIGNANT TUMOUR

By J. C. GHOSH, M.B.

Calcutta

J. N. P., a Hindu male, aged about 60, a native of Murshidabad district, came to me on

the 3rd January, 1935, with the following complaints:—

- (a) A swelling immediately below the right ear which has advanced on to the face as well as posteriorly, and also into the neck.
- (b) Pain over the swelling, which exacerbates at times and radiates to the back of the head.
- (c) Lacrimation from the right eye.
- (d) Dribbling of saliva from the right side of the mouth.
- (e) Slight fever.

The patient says that the swelling has been present for six and a half months and it has gradually developed to its present size. He suffers from pain especially when he lies on the right side. He feels comfortable, when he bends his head and neck on the affected side. He has had epiphora and dribbling of saliva for about a month. When he attempts to drink water or other fluid part of it escapes from the right side of the mouth. He also has partial difficulty in opening his mouth.



He gives a history of penile sores and thereafter eruptions on the body, in youth.

Family history.—Nothing bearing on the present illness.

Physical examination.—The swelling:—(1) Situation:—below the right ear, extending forwards to about the anterior border of the ramus of the mandible and posteriorly over the sterno-mastoid to the adjacent portion of the posterior triangle and below to the anterior triangle to the level of the hyoid bone. The swelling has, moreover, masked the angle of the mandible and the mastoid process.

(2) The superjacent skin is adherent to the swelling. Recently the portion of the skin behind and below the external ear has turned 'eczematous'.

(3) The swelling is very hard and fixed.

Face:—The right side of the face, as a whole, appears to be swollen and sagging downwards. It shows:—

- (a) Smooth forehead—right half—there being no wrinkle formation.
- (b) Right eye appears to be narrower than the left. Right eyelids close imperfectly and are oedematous.
- (c) The angle of the mouth is drawn upwards and to the left; this retraction becomes more prominent on attempting to set the teeth upon one another.
- (d) The tongue deviates to the affected side.

These physical signs together with epiphora and dribbling of saliva and escape of fluid from the mouth indicate facial paralysis.

Other findings

Right trapezius.—The cervical portion (the part between the occiput and the acromion) is atrophic, the natural slope between the neck and the shoulder has become less definite and has been rather converted into a hollow, raising of the right upper arm above the shoulder is affected, and the patient feels discomfort in maintaining extension of the head.

In the right-posterior triangle, there is a well-marked ridge-like elevation, ascending from the clavicle upwards and medial-wards; this is presumably the levator angulae scapulae. The prominence of this muscle is most probably due to the increased action forced on it in keeping up the point of the shoulder without the assistance of the trapezius.

Right sterno-mastoid.—The upper half is masked by the swelling; the lower half cannot be properly felt. Again there is want of prominence due to the contraction of the muscle. The rotation of the neck to the opposite side and the bending of the head to the same side is however not affected, but the movements are not free.



No other abnormalities except slight prolongation of breath sounds with some harshness and a few crepitations on both sides.

Comment on the case.—The swelling is in the situation of the right parotid gland. Its rapid growth in six months, its extreme hardness, immobility, adhesion and apparent involvement of the skin and the resulting facial paralysis all suggest that it is a malignant growth of the parotid gland.

An interesting point in this case is that in addition to facial paralysis, there is also present atrophy of the trapezius and sterno-mastoid muscles on the same side. The atrophy of these muscles suggests that the growth has exerted pressure on the right spinal accessory nerve and most probably compression paralysis is present.

The lower part of this nerve passes through the neck along a line drawn from the angle of the mandible to the mid-point of the posterior border of the sterno-mastoid. It pierces the sterno-mastoid about the level of the angle of the mandible five centimetres from the mastoid process. The growth of the parotid has encroached into the neck beyond this line. So,

it is natural to assume that it has compressed the nerve.

The following quotation from 'The Elements of Surgical Diagnosis' by Dr. Gould supports this contention. 'Injury of the spinal accessory nerve shows itself in paralysis of the sterno-mastoid and of the cervical part of the trapezius'.

VIPER SNAKE BITE: TREATMENT AND RECOVERY

By C. R. CHETTI

Bassein, Burma

A HINDU male, aged eighteen, a gardener, was bitten by a yellow-spotted viper at 3 p.m. on the 2nd January, 1932, about three inches below the left knee on the outer aspect of the leg.

History.—He was bitten while cutting grass and was brought to me at about 3-30 p.m.

Condition on admission.—The patient was unconscious, pulse feeble, respirations hurried and 48 per minute, body and extremities fairly warm and perspiring freely. Pupils—dilated.

Treatment adopted.—A ligature was immediately applied above the knee, a few scarifications were made over the bite and potassium permanganate crystals dissolved in a little water was rubbed in and covered by a bandage. Twenty cubic centimetres of antivenin were injected into each median basilic vein. About five minutes after the injection the man recovered consciousness and when questioned he said he did not remember anything after he was bitten by a snake while he was cutting grass in the garden. Apprehending hæmorrhage, I gave him 40 grains of calcium chloride dissolved in two ounces of water internally. About half an hour after the injection his pulse improved and he was able to walk. After keeping him for about two hours he was sent back to his house with instructions to report his condition to me the same evening. A messenger came the same evening and informed me that the patient was passing blood in the stools. The calcium chloride mixture was continued thrice daily and after two days the mæna stopped. The wound was dressed for four days by which time the man had completely recovered.

A CASE OF MELANOMA OF RECTUM

By S. R. INGLE

Sub-Charge, Civil Hospital, Jalgaon E. K.

Case report

A HINDU male, aged about 45, was admitted to this hospital on 6th February, 1935, with the history that he had been passing loose motions, containing mucus and blood with tenesmus and prolapse for about a month and a half. Prior to this, he was enjoying good health.

On admission, he was found to be weak and anæmic from loss of blood and sleeplessness caused by constant pain. Physical examination of the chest and abdomen was negative. No enlarged glands could be detected. An examination of the rectum revealed a soft, nodular, pedunculated, easily bleeding, painful and tender mass the size of a small orange, springing from the left lateral and posterior wall of the rectum. A similar but a smaller growth could also be palpated just below it. A clinical diagnosis of papilloma was made and the patient was operated on by the civil surgeon on 20th February, 1935, and the tumours were excised. His convalescence was uneventful. He was discharged

'cured' on 2nd March. The Director, Haffkine Institute, Bombay, to whom the growth had been sent for a pathological examination, reported it to be a melanoma.

The rarity of such a condition has prompted the publication of this note.

I can find no reference in the available literature to the presence of such a tumour in the rectum. These neoplasms generally grow from the pigmented areas of the body such as the rete mucosum of the skin, pigmented moles, or the choroid of the eye. Its presence in the rectum may, however, be explained by the fact that melanin is formed in relation to the cells and stroma of certain epithelial tumours, giving rise to melanotic cancer.

I am grateful to the civil surgeon for his kind permission to publish these notes.

A CASE OF SEVERE BLEEDING AFTER TOOTH EXTRACTION*

By M. N. SIRSAT, L.C.P. & S.

Medical Officer in charge, Dispensary Mokhada, Thana District

A MOHAMMEDAN aged 35 came to Mokhada dispensary for extraction of teeth on 8th February, 1935. Three teeth were extracted at one sitting and there was unusual bleeding from the socket of the upper right second molar; this was checked with an iodine swab. Early on the 10th of February profuse bleeding started from the same socket and the patient came to the dispensary at about 3 a.m. for admission.

Treatment.—On admission a gargle of potassium permanganate was given and the tooth socket packed with gauze soaked in iodine. This was ineffective so an adrenaline pack was tried and calcium lactate given every half hour but the bleeding continued. A turpentine pack was now tried but without apparent effect as it became soaked in blood and had to be renewed about every half hour. At 5-30 a.m. an injection of morphia and atropine was administered without effect and at 6 o'clock he was given a hypodermic injection of 5 c.cm. of horse serum and the bleeding stopped. The patient slept for about five hours and was allowed some tea to drink, which started the bleeding again.

A pack soaked in tincture of perchloride of iron was now tried but it had no effect, so turpentine was again used and a second injection of 5 c.cm. of horse serum was given. This controlled the bleeding and there was no recurrence until 9 a.m. on the 12th about one hour after the pack was removed from the socket and was not renewed. A fresh pack of perchloride of iron was tried and a gargle of hydrogen peroxide used but without effect, so the socket was again packed with a turpentine swab.

About a year previously I had had a good result with emetine in controlling bleeding from the nose and gums in a case of snake bite, so I tried an injection of gr. $\frac{1}{2}$ of emetine hydrochloride in this case and the bleeding stopped at once.

The next morning the pack was again removed and half an hour later there was a recurrence of the bleeding. The socket was again packed with turpentine-soaked gauze and a second injection of emetine given, and after some time the bleeding stopped and did not recur.

Although the evidence that emetine controlled the bleeding in this case is inconclusive its effect is certainly suggestive.

* Rearranged by Editor.

Indian Medical Gazette

MAY

SPLENIC ANÆMIA AND TREATMENT BY SPLENECTOMY

THERE are probably few clinical conditions that are a greater source of annoyance to the officer in charge of a general medical outpatient department in Bengal than that in which there is considerable enlargement of the spleen, definite anæmia, slight fever and a general feeling of malaise; such cases often form a comparatively large proportion of the total attendance. Kala-azar, chronic malaria and leucæmia can usually be excluded without much difficulty; the first by means of the formaldehyde test, the second by examination of a blood film for malaria parasites or by a therapeutic test with the cinchona alkaloids, and the third also by a blood film examination. After exclusion of these three common causes of splenic enlargement there is still a considerable residue. By more elaborate laboratory examination, such as a Wassermann reaction, it will be possible to pare down this group still further, but many cases will still remain and as they seldom improve on ordinary medical treatment they tend to accumulate amongst the 'old cases'.

It is a time-honoured maxim, which practitioners in the five continents have always followed, that in all cases a diagnosis must be made, so the two constant symptoms in this group of cases have been used to coin the word 'splenic anæmia'; if even there was a good answer to the question 'When is a diagnosis not a diagnosis?' it is 'When it is splenic anæmia'. This fact has been fully recognized and expressed by such phrases as 'incomplete knowledge is essential to the diagnosis' (Mayo) and 'if we know the cause of splenic anæmia, it is no longer a case of *splenic anæmia*' (Moynihan). The name 'Banti's disease' is applied to a slightly more definite symptom complex, but still even this has no established ætiology; Banti's original suggestion that it was due to a toxin that had a specific action on the spleen seems to have been of the nature of a guess and has never received any experimental support.

By a process of not very deep reasoning the term 'tropical splenomegaly' has been applied to conditions of splenic enlargement of unknown ætiology that occur in the tropics, and for the condition as it is encountered in Bengal the term 'Bengal splenomegaly' has been applied. By a similar process of argument the cases of enlarged spleen that occur in the Punjab might very well, and probably have been, referred to as 'Punjab splenomegaly'. It might be said that such multiplication of names is ridiculous,

but we do not agree; both Bengal and the Punjab are tropical (or sub-tropical) countries but in some ways their climates are as different from one another as either is from the climate in Italy, for example; it is therefore possible that the ætiology of the splenic enlargements in these two countries is different, and it is as well to maintain the distinction until such time as the conditions are shown to be the same.

The splenomegaly that is encountered in Bengal shares many of the characteristics of Banti's disease; it is chronic, it is commonest in early adult life, it is primarily a splenic enlargement that is usually followed by enlargement and finally cirrhosis of the liver, and ascites; hæmorrhages from mucous membranes occur but the profuse gastro-intestinal hæmorrhages that are described in Banti's disease do not appear to be common. There is a marked anæmia but this is seldom extreme and does not seem to be very definitely progressive, the anæmia is said to be of the microcytic hypochromic type, but we have not always found this to be the case and it is certainly not markedly hypochromic, there is always a granulocytopenia, urobilin is present in the urine in excess and the van den Bergh, direct delayed, reaction is often positive.

Histologically, there is considerable disorganization of the spleen structure, the malpighian follicles are reduced and eventually almost entirely replaced, there is considerable endothelial cell proliferation, some increase of the reticular fibres and thickening of the trabeculae and capsule; the thrombosis of the splenic vein that is described in cases of Banti's disease in Europe has not been noted, nor has the dilatation of the œsophageal and gastric veins.

The feature that links the splenomegaly of Bengal with Banti's disease is the complete failure of all forms of medicinal treatment to stay the course of the disease; after many years of ill-health the patient usually dies of some intercurrent infection. Surgical treatment, that is to say, removal of the spleen appears to be the only form of treatment that offers any hope. This has for some years been the recognized treatment for Banti's disease in temperate climates and on the whole the results have been fairly satisfactory; a 50 per cent cure rate is claimed. In the tropics not only the patient's prejudice against surgical interference but also a deep-rooted feeling on the part of the medical profession in these countries that the spleen is more important to the residents in the tropics than it is to those who live in temperate climates has to be overcome. This is partly due to the fact that in certain diseases, for example, kala-azar, removal of the spleen has had very unsatisfactory results. Those who have followed the experimental work on malaria in monkeys will, we feel sure, hesitate before allowing their spleens to be removed lightly. It has been shown that the monkey,

Silenus irus, habitually harbours a plasmodium that in the ordinary course of events seems to cause him little inconvenience, but that if his spleen is removed the infection fulminates and is frequently fatal. There is, of course, a difference between the reactions to infection of *Silenus irus* and of *Homo sapiens*, but the analogy is too close to make one feel entirely happy about the chances of survival for any considerable time in a tropical country, without a spleen.

In Europe this question of the splenectomized has been studied fairly thoroughly; recently in Switzerland, Renfer followed up 15 persons who had had their spleens removed following accidents; the average time interval since the removal of the spleen was about 10 years. Fourteen of the fifteen were still alive; three had distinctly impaired health, but it was difficult to attribute their conditions to loss of their spleens as other organs had been damaged at the time of their accidents. This investigation was made from the point of view of accident indemnity, and the conclusion arrived at was that loss of spleen *per se* did not constitute grounds for indemnity.

There are two papers in this number of the *Gazette* that deal with the surgery of the spleen. The authors of these papers report 10 and 19 cases respectively, in which splenectomy was performed; in the first series the spleens were removed for medical and in the second for surgical reasons. One death occurred in each series immediately following the operation; in view of the seriousness of the operation this must be considered a very satisfactory immediate result. However, the really important point is to know the after-history of these patients, and we sincerely hope that these writers will endeavour to keep in touch with their patients for some years. Colonel Palit, the author of the first of these two papers, is a surgeon, and had not the facilities for carrying out detailed medical investigation of his patients before and after operation, but from the blood counts he gives it appears that most of his cases could be classed as 'splenic anæmia', that is to say, they had definite but not profound anæmia, and a leucopenia that was most marked in the polymorphonuclear group. It is also apparent that the blood counts returned to normal after the patient had recovered from the operation.

These two papers indicate a considerable advance in the surgery of the spleen in India, and they also suggest that surgical removal of the spleen may be as safe an operation in India as it is in non-tropical countries. There is undoubtedly a very great opportunity for a combined surgical and medical investigation on this subject. The prognosis in these cases of 'splenic anæmia' is very poor; medicinal treatment seldom effects more than a temporary improvement, and, though the patients may not be acutely ill, they usually remain in a state of

subnormal health for a few years and then die of some intercurrent infection.

In our present state of knowledge we do not consider that it is justifiable to recommend indiscriminate removal of spleens for this whole group of cases, but the evidence at our disposal would certainly justify a clinical experiment on a large scale in cases in which other treatment has failed to produce either any improvement at all, or only temporary improvement. By this we do not mean to suggest that the patients should be left until they are *in extremis*, or even allowed to go on to the stage of liver cirrhosis and ascites, as this would scarcely give the surgical treatment a fair trial, but they should be placed under medical treatment for some months during which time a very careful watch is kept on their progress. Those cases in which improvement up to a stage can be effected but which tend to relapse directly this treatment is discontinued will probably prove to be the most suitable for surgical treatment, as in these cases intensive medicinal treatment can be given immediately preceding the operation, and the operation risk thus lowered very considerably. It is said that cases in which the platelets are reduced are the best subjects for operation; where the platelets are increased thrombosis is liable to occur.

In order to obtain the best research value from such an experiment, it would be essential to carry out very complete hæmatological examinations, before, during and after splenectomy, in order that the cases might be arranged into different groups, or their homogeneity established, as it is possible that in one class of case the operative treatment might be successful and in another unsuccessful, or even dangerous, a histological study of the spleens should be made, and, perhaps most important of all, the cases should be followed up for a number of years and some arrangements made for periodic re-examination.

BRITISH SPAS

How often does the doctor in this country advise his patient to take leave in Europe, and how seldom is this accompanied by any further advice as to where he should go and how he should spend his time for the greatest benefit to his health? If the patient's home is in Europe, he will naturally wish to go to some place near his home and as to how he shall spend his time he will usually have very fixed ideas on this subject which will vary according to his individual taste. This does not however absolve the doctor from the responsibility of giving sound advice, and also of impressing upon his patient the necessity for following it. If on the other hand the patient is an Indian, advice on this subject will almost certainly be sought and will probably be followed more readily.

Though after debilitating illnesses, such as malaria and dysentery, the voyage to England

will often enable the patient to regain his original health, there are other instances where the patient remains in an indifferent state of health, seeks only casual medical advice, and eventually returns after six months' leave in possibly an improved but at the same time a definitely subnormal condition, whereas two months of spa treatment under proper medical discipline would have made all the difference. In cases where the doctor has to consider the interests of the employer as well, he should in certain circumstances insist that the patient follows some sort of health regimen.

There are in Great Britain nearly four hundred inland or sea-side health resorts but there are only about sixteen spas where some form of organized medical treatment is carried out. This figure compares unfavourably with that of some of the other European countries, such as France and Germany, where there are, respectively, 83 and 58 recognized spas. However, there is not much advantage to the individual patient in this multiplicity, and it is usually possible from these sixteen British spas to choose at least one that will suit his particular requirements. Though there are spas in the south of England, such as Bath and Cheltenham, particularly suited to winter treatment, the 'tonic' spas, such as Harrogate or, further north, Bridge of Allan, are far more suited to the requirements of the majority of patients returning from the tropics and taking leave in the summer months than are the more sedative spas on the continent of Europe, where the climate is much warmer and is occasionally oppressively hot, and where one of the great advantages of climatic treatment, contrast, is lost. This of course does not apply to the Alpine spas, but in this case there is the danger that the contrast may be even too great.

It has for many decades been the fashion for doctors in England to order their patients to go 'abroad' without considering fully whether the patient's condition could not be treated as well in Great Britain, for there are some four or five British spas with quite remarkable properties, equal to if not better than any that

can be found in other countries. However, in recent years economic conditions have changed, foreign exchange rates have become unfavourable to the visitor from England, and British spas are coming into their own; their special advantages are being appreciated and they are being patronized far more than hitherto by the residents of other parts of the British Isles, and therefore they are being developed. Although of course the waters and the climate are the same, the facilities for special forms of treatment are being increased.

Another important point is that in other countries where there are large numbers of spas the advantage to that country that accrues from the attraction of a number of visitors has been fully appreciated and the national value of these health resorts has been recognized for a number of years; consequently the training of graduates in this special branch of medicine has been far more highly developed in these countries than it has in the past in England. Here the teaching in balneology and allied subjects has been to some extent neglected, but there are signs of a very distinct revival. Furthermore, with the formation of the British Health Resorts Association, scientific and accurate information on the subject of spa treatment in Great Britain is now much more easily obtained. All this has tended to increase the standard of treatment given at the British health resorts and spas.

Doctors in India have always recognized the special advantages of the British spas; this can be gathered from the high percentage of Indian residents that will be found amongst the visitors to any of these spas; but in the past they have often been discouraged from sending patients to the spas from lack of information and by the absence of specialization in the treatment of certain conditions. This cause of complaint is rapidly being removed, and there are now few conditions, amongst those to which spa treatment can be expected to do good, that cannot be treated as well at one of the sixteen British spas as they can at the spas in other countries.

Special Articles

THE TRANSMISSION OF KALA-AZAR IN INDIA*

By L. EVERARD NAPIER, M.R.C.S., L.R.C.P.
Calcutta School of Tropical Medicine, India

FIRST of all I should like to emphasize the geographical limitations of the title of this note, the transmission of kala-azar in India. Though it is very probable that when the whole story of the aetiology of the disease is told we shall find that there is the

closest correlation between the means by which it is transmitted in different parts of the world, at present, in view of certain apparent striking differences in its epidemiology in the various endemic foci, it is as well for workers who have investigated the disease in one endemic focus only to limit their conclusions to that area. For example, in the Mediterranean endemic areas kala-azar is a disease of infants, whereas in India it is rare in infants, the second and third quinquennial age groups show the highest incidence, and a large number of adults are affected. Admittedly, the more closely the disease is investigated in Europe, the greater is the number of adult cases encountered, and similarly in India, until the investigations were carried into the villages, it was looked upon mainly as a

* Being a paper read at the Ninth Congress of the Far Eastern Association of Tropical Medicine at Nanking on 4th October, 1934.

disease of adults and adolescents. However, no amount of close investigation will wash out the essential differences between the age distribution of the disease in these two endemic foci.

In the transmission of a disease there are so many factors involved that an essential difference in epidemiology does not necessarily mean difference in the mode of transmission; on the other hand, such differences in epidemiology do make differences in the mode of transmission in the various endemic areas a possibility that should not be ignored, and excuse one from the necessity of fitting the picture evolved in one country to conditions in another.

Between the epidemiology of kala-azar in China and in India there do not seem to be any *very* great differences. This remark is conditional, being based on first-hand knowledge of the disease in one country only, and in the other on information gained from the literature and in discussions with investigators from China, especially with my friends the late Dr. Young, Dr. Struthers and Dr. Smyley, so that such differences as have been noted may be apparent only, or on the other hand there may be more important disparities which my limited knowledge of conditions in China has led me to overlook. For example, Dr. Young did not find any evidence of epidemic incidence, nor of house incidence in the endemic areas; these are familiar features of the disease in India, and it is possible that recent investigations in China may have shown that they exist there also.

Let us turn to another aspect of the disease; the anatomical distribution of the causative organism seems to be different in the two countries. In early days in China Cochrane resorted to gland puncture as a means of diagnosis, whereas in India we have rarely found the parasite in lymphatic glands, either during life or *post mortem*. The histological studies of Meleney (1925) and others seem to indicate that submucous infection in the intestinal tract is far more common in China than in India, and recent clinical observations indicate that the same is true with regard to the respiratory submucosa. Cash and Hu (1927) were able to demonstrate leishmania in the skin in cases of kala-azar with considerable frequency, whereas we in India have always failed in cases of kala-azar, though in the post-kala-azar dermal lesions we can usually demonstrate the parasite histologically and always culturally. This may simply be a matter of technique, but other workers in India besides myself have failed to demonstrate the parasite histologically in the skin during the visceral stage of the infection. Culturally, of course, the parasite can be demonstrated, but it is impossible to exclude the peripheral blood as the source in this case. On the other hand post-kala-azar dermal lesions have not been demonstrated in China. Thus the histological and clinical observations would appear to be entirely contradictory.

I do not propose to discuss in detail the early investigations into the kala-azar transmission problem, but certain implications of your recent work in China have made me feel that a short reference to some of our early, sterile investigations might not be out of place. Since the conclusion of the Great War allowed us to turn our attention to such problems, there have been two major investigations into kala-azar in India, the enquiry at the Calcutta School of Tropical Medicine with which I have been associated for the last fourteen years, and the Kala-azar Commission under the Indian Research Fund Association which operated, mainly in Assam, for about seven years, from 1924-31; for the last three and a half years these two investigations have been in effect combined. I think I may say that, in the case of both these enquiries, the workers started with very open minds. Col. Christophers (now Sir Rickard) the director of the latter enquiry, who at that time enjoyed a world-wide reputation for his entomological investigations

and might therefore have been thought to be prejudiced in favour of insect transmission, spent the first six months or so after the formation of the commission exploring the possibilities of direct transmission, until our observations in Calcutta directed his attention to the sandfly. Again, in Calcutta I myself was very much impressed by the apparent association between insanitary conditions and kala-azar, and, whilst collecting data, which when analysed later showed that this association was more apparent than real and that I had probably been misled by a partial correlation, we carried out systematic examinations of the secretæ and excreta of our patients. We examined the urine, faeces, sputum and nasal mucus, with consistently negative results, except that we found from time to time suspicious bodies in the faeces which we believed were yeasts. Shortt (1923) obtained a positive culture from the urine of a kala-azar patient, but we (Napier and Das Gupta, 1923) found that, though a single drop of blood of a patient added to a catheter specimen of urine enabled us to recover a leishmania culture, we could never obtain this growth from a kala-azar patient's urine that was entirely free from albumin. Shortt and his colleagues on the Kala-azar Commission (1929) found undoubted leishmania bodies in the dysenteric stools of kala-azar patients, and more recently we have found leishmania in the nasal smear from a case of dermal leishmaniasis (Napier and Das Gupta, 1930). Against these few positive observations there is a great number of entirely negative ones that have never been fully reported. None of these findings is, in my opinion, very important, as, though they demonstrate means by which the parasite *can* leave the body, the conditions were in each case exceptional and they do not constitute any regular channel of escape. Further, as neither the development, nor even the survival, of the parasite under conditions obtainable in Nature has been demonstrated, immediate transference of the virus to the second host would appear to be essential if infection is to take place. Mention of these findings has only been made to emphasize the fact that, whilst the sandfly has undoubtedly received the lion's share of the attention of workers in India, the possibility of direct transmission taking place has never been lost sight of.

Our first discovery of the development of *Leishmania donovani* in the sandfly *Phlebotomus argentipes* was not a chance observation, but the result—fortunately the early result—of a campaign of investigation that had been decided upon some time before. From the data that we had collected we found that in the centre of Calcutta was a focus of intense infection, whereas in other parts of the city only imported cases were encountered. Now kala-azar is a disease that is usually associated with rural conditions, where artificial sanitation does not exist and arthropoda abound, and where to look for the special factor or factors associated with kala-azar transmission is looking for a needle in a haystack. This focus in Calcutta, however, where conditions were more standardized and flora and fauna less various, seemed to provide a great opportunity for investigating the conditions associated with kala-azar transmission, a second area in Calcutta, where there were many imported but no indigenous cases, serving as an excellent control. [The three important conditions noted were (a) vegetation in close proximity to the dwelling, (b) earth unprotected by cement or paving, in or around the dwelling, and (c) ground-floor residence.]

It would be wrong to say that this general survey gave us a direct pointer towards the sandfly, but it did narrow the field of investigation, it added strength to the suggestion that some species of sandfly might be the transmitter, a suggestion that had been made mainly on analogy with the supposed transmission of oriental sore by an insect of this genus, and as far as I was personally concerned it gave the first definite set-back to the theory of direct transmission that

hitherto I had favoured; the infected area was neither the most insanitary nor the most crowded area in the town, and in many more insanitary and more crowded quarters only imported cases could be found. At this point an entomological assistant was added to our enquiry and a survey of the arthropoda of this area was commenced. Our main attention was directed towards the phlebotomi and the culicoides. At first only sandflies of the 'minutus' group, primarily lizard feeders, were found, and then immediately the monsoon conditions set in *Phlebotomus argentipes* appeared in large numbers. (This early failure to find *argentipes* was in part due to inexperience as they are actually present in varying numbers throughout the year.) Laboratory breeding of these sandflies was immediately started and within a very few months we had demonstrated the development of leishmania into its flagellate stage in this species (Knowles, Napier and Smith, 1924). Christophers in Assam immediately switched over on to this line of inquiry and for some time everything seemed to be working to plan; he and Shortt (Christophers *et al.*, 1926, and Shortt *et al.*, 1926) demonstrated that the flagellate infection in this insect progressed anteriorly and that after a certain time the mouth parts were involved so that in taking a blood-meal the sandfly must inevitably infect the wound, and many other important observations were recorded that seemed to make it only a matter of months before the complete natural cycle of this infection would be worked out. It was just ten years ago, almost to the day, that the development of leishmania in this sandfly was discovered and yet to-day we cannot claim to have established the sandfly hypothesis beyond any possible dispute, in the way for example that the transmission of malaria by anophelines has been established; we have transmitted the infection from a kala-azar patient to a previously-uninfected hamster by the sole agency of the sandfly, *Phlebotomus argentipes*, on three separate occasions, but against these successful transmissions we have a large number of failures that are unexplainable in the present state of our knowledge, and we have so far entirely failed to transmit the disease to man by the agency of this sandfly; and yet we—I speak for myself and my colleagues at the Calcutta School of Tropical Medicine—are more convinced to-day than we were ten years ago that the sandfly is the main transmitter of kala-azar in India.

Putting aside the biological considerations—the development and anterior location of the flagellate infection in the sandfly by which it is distinguished from natural flagellate infections and which in the opinion of protozoologists is unlikely to be purposeless, and the fact that, in India, only in this species has such a degree of development been observed to take place—and the positive transmission experiments I have just referred to, let us enumerate and consider some of the points in favour of the sandfly hypothesis:—

(i) The sandfly, *P. argentipes*, has been found, in large numbers when looked for at the right time of year, in every kala-azar endemic area in India.

(ii) Though the geographical distribution of the sandfly does not correspond exactly with that of kala-azar, the species is found in large numbers for the greater part of the year only in those areas where kala-azar is prevalent.

(iii) Certain meteorological and physiographical conditions that have been found to be constant features of the kala-azar endemic areas, *e.g.*, alluvial soil, high rainfall, and an equable humid tropical climate, appear also to be essential for the breeding of this sandfly and for the full development of the flagellate infection within it, in nature and, as far as temperature and humidity are concerned, in the laboratory.

(iv) The kala-azar curve appears to correspond closely with the sandfly incidence curve, allowing for a 3 to 4 months' incubation period.

(v) The rural incidence of the disease, and the association with vegetation, unprotected soil and ground-floor residence when the disease occurs in a town. (These sandflies breed in soil in which there is a certain amount of nitrogenous matter, as supplied by household refuse or domestic animal droppings; they breed in the earth protected by the overhanging eaves of houses, under trees and bushes, or other heaps of refuse.)

(vi) The house incidence of the disease and the fact that moving an infected household to a new site will often break the infection chain. (Sandflies have a limited flight and therefore breed only near their food supply.)

(vii) In nature, this sandfly persistently feeds on man; about 33 per cent of the fed flies that are caught contain human blood; and whenever any considerable number of wild flies caught in an endemic area are examined some infected flies are always found.

(viii) During an epidemic or hyper-endemic period actual cases of kala-azar supply a rich source of infection for sandflies, an average of 15 to 20 per cent of the latter becoming infected after a single feed on a kala-azar patient.

(ix) During a hypo-endemic period there seems to be every reason to suppose that the majority of clinically-cured patients provide a continuous, though less rich, source of infection, *whether they show dermal lesions or not.*

Some explanation of this last statement is necessary. In India—at least in two of the main areas of endemic incidence of the disease—a common sequel to visceral leishmaniasis, *i.e.*, kala-azar, is dermal leishmaniasis. One particular manifestation of this condition was first described, only 12 years ago, as dermal leishmanoid, and was thought to be a rare complication of treated kala-azar, but this skin infection is now recognized to be a very common end-result of a visceral infection, whether treatment has been given or whether spontaneous cure has taken place, to display a large variety of clinical manifestations, and in some instances to display *no clinical manifestations whatsoever* (*vide infra*). The nodular, or 'dermal leishmanoid', type is by no means the most common, though probably it may be considered the most characteristic. The nodular, or any of the hypertrophic, forms are likely to bring the patient under medical notice; it is difficult to estimate the incidence of these but probably it would not be far wrong to say that in Bengal one per cent of treated patients developed lesions of this nature. The macular depigmented form is on the other hand quite likely to be overlooked by the patient; in a village treatment centre we made a rapid inspection of 120 patients who had been treated for kala-azar and cured clinically during the previous five years, and found well-developed macular lesions of dermal leishmaniasis in 6, or 5 per cent, of them.

Now these dermal lesions may appear on any part of the body, they sometimes appear all over the body, they are nearly always widespread; they appear more or less spontaneously on different parts of the body, and though the lesions do enlarge both centrifugally and centripetally there is no suggestion of direct extension of the infection along a limb or to other parts of the body, nor is there any evidence of lymphatic spread. Thus it seems apparent that the distribution of the infection is by the blood; and, as parasites are always present in the blood during the visceral phase but disappear from it when the patient is cured and are not found during the dermal phase, one must conclude that the dissemination of the parasites to their dermal foci takes place during the visceral phase. The lesions usually appear about one year after the signs and symptoms of the visceral attack have subsided; that is to say there is a latent period of about one year before the first clinical manifestations of the dermal infection appear, during

which time the parasites are lying more or less dormant in their dermal foci.

The dermal infection is apparently a fairly chronic condition, but it does sometimes clear up spontaneously, and this spontaneous recovery is more often noted in the case of the macular, depigmented lesions.

I put forward the suggestion some time ago (Napier, 1931) that, as about one per cent of kala-azar patients develop lesions that reach the hypertrophic stage and about 5 per cent develop lesions which stop at the macular stage, it is conceivable that a much larger percentage have a dermal infection that never reaches the clinical stage at all, or, to carry this hypothesis further, that a dermal infection is a constant sequel to a visceral infection, that in only a small percentage of these patients does the infection reach the clinical stage, and that though it may be difficult to demonstrate this skin infection histologically, sandflies will become infected after feeding on persons with this subclinical infection.

It has been shown that sandflies readily become infected when they feed on the nodular lesions of dermal leishmaniasis, on the macular depigmented lesions and even on areas of skin on which there are lesions so minute that they would be overlooked by the average medical man who had had no special experience of this condition (Napier, Smith, Gupta and Mukerji, 1933), and now Dr. Smith has carried this line of work one stage further; he has fed laboratory-bred sandflies on clinically-cured kala-azar patients in the convalescent stage, in whose blood-cultures no leishmania could be demonstrated, and has found that a quite considerable percentage of these flies became infected (I cannot give the exact figure as these investigations have not been completed, though I have Dr. Smith's permission to refer to them; however, I can say that it was not a matter of just one or two flies in a few hundred being infected). Finally, he has fed sandflies on one of the laboratory servants who had had kala-azar a year previously but who had no clinically-apparent dermal lesions at all, and he has found two or three infected out of a batch of about twenty (again, I am uncertain about the exact figures).

These few observations do not perhaps establish my theory *in toto*, but they do prove quite definitely that the ex-kala-azar patient who shows no clinical evidence of either visceral or dermal infection can act as a carrier of leishmania, and they lend strong support to the suggestion that a large number of these patients do remain as carriers for varying periods.

This seems to me to open up wonderful vistas of the epidemiology of the disease in the endemic areas; we have the three factors, (a) the ever-ready supply of the virus, (b) the sandfly transmitter and (c) the susceptible population. When conditions are sub-optimal, there are comparatively fewer sandflies and many of those that become infected do not live long enough to allow full development and transmission of the leishmania to occur, or, when there are too few remaining susceptibles in the population, then in either of these circumstances only sporadic cases will occur, or the disease may even appear to die out altogether in an area for a few years. In time a fresh susceptible population grows up and then, as (a) the supply of the virus is still present, it only requires a year favourable to sandflies for the occurrence of one of those exacerbations of kala-azar endemicity which characterize the history of the disease in India.

In rural areas the sandfly population is enormous (and sandfly control will I am afraid be a very difficult problem). I can give you some idea of the state of affairs when I tell you that Dr. Smith recently found as many as 200 larvae in a one-pound biscuit tin of earth collected in the neighbourhood of a kala-azar-infected hut in a village near Calcutta. However, in rural areas the population is scattered, it is a more

or less constant one, and the sandfly has many alternative hosts; on the other hand, in towns, conditions for sandfly breeding may be absent, and in these circumstances kala-azar is also absent, or the conditions may be such as to allow a limited amount of sandfly breeding, and then the density of the human population compensates for any deficiency in the sandfly population, alternative hosts are usually absent and the flies therefore concentrate on human hosts, and the population is less constant (that is to say it is frequently diluted by susceptibles), so that in these urban areas the incidence level is often high and the distinction between the periods of high and low incidence is always less marked than in the villages, where, as I have said, the disease will sometimes seem to disappear for a year or so.

I think it will be apparent to you that in this scheme it is not necessary to postulate that every infected sandfly 'bite' (I am speaking colloquially) will produce kala-azar; at the height of an epidemic wave (*sensu lato*) everybody in an infected village must be subjected to an enormous number of 'bites' by infected flies, and yet many, even of the most susceptible age groups, seem to escape infection. In this disease, as in most other diseases, the human resistance factor must play an important part, and whether it is a matter of repeated subjection to infected bites being necessary or whether some other factor determines the visceralization of the infection that the sandfly implants in the skin is not a matter that I propose to discuss here, though I consider that we have a strong case in favour of the second alternative; the point was raised to emphasize the fact that little importance need be attached to the apparent failure of our human transmission experiments.

This leaves our failure to imitate in the laboratory the conditions under which sandflies transmit kala-azar in nature, closely enough to ensure transmission of this infection to the susceptible hamster, not just now and then, because we have done this, but on every occasion that it is attempted, as the only point against our sandfly hypothesis of the transmission of kala-azar. On the other hand all our other laboratory observations, and every epidemiological observation that has been made in India, are in keeping with the hypothesis that the sandfly, *Phlebotomus argentipes*, is the normal transmitter of kala-azar in that country. The circumstantial evidence in favour of this hypothesis is so overwhelming, and the theoretical superstructures that we have built are so exactly in accord with epidemiological experience in the endemic areas that I hope you will see how difficult it would be for us to believe that they are founded on a fallacy.

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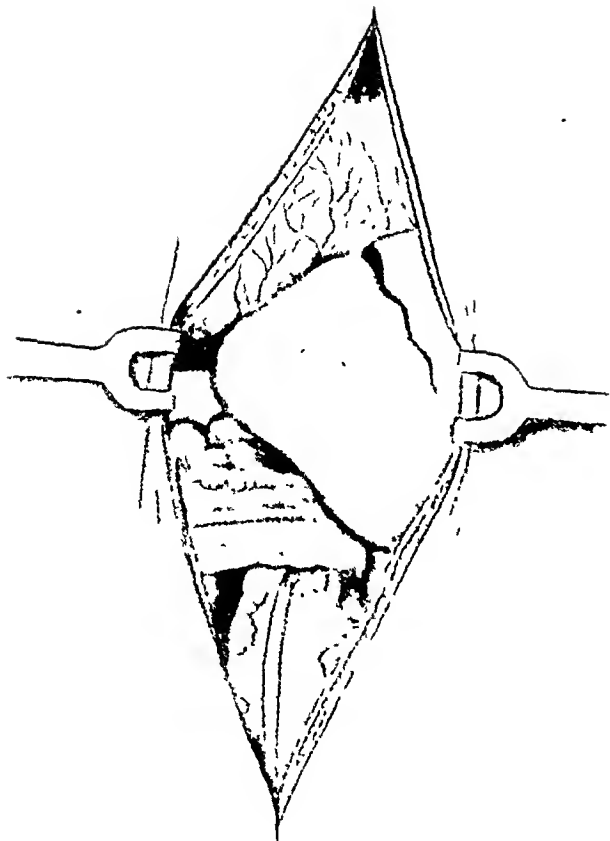


Fig. 1.—The abdomen is opened and the edges of the wound are retracted showing the rupture on the anterior border and the diaphragmatic surface. On account of the operative position of the patient the enlarged spleen has moved more towards the middle line than is usual even for an enlarged spleen. Note how it overlies the stomach.

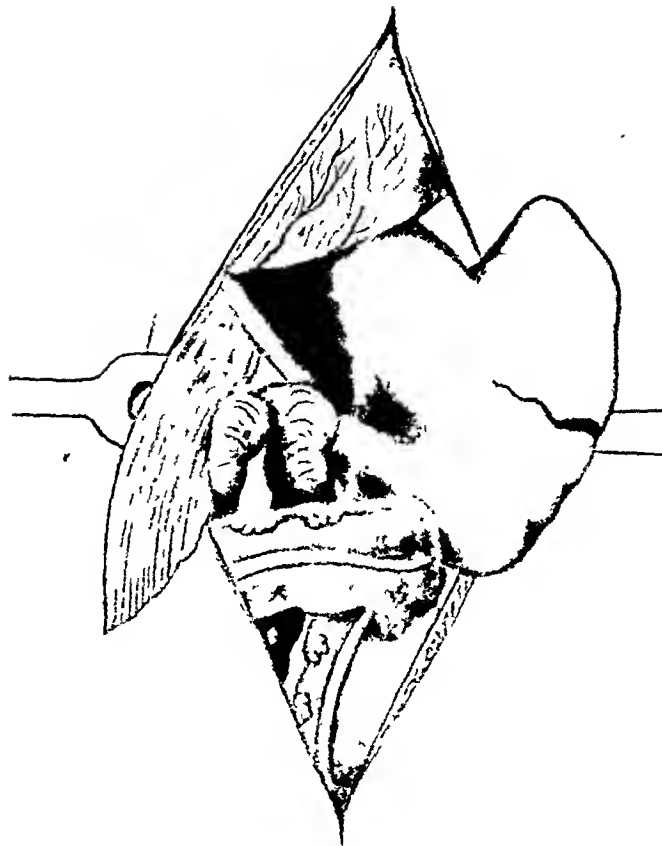


Fig. 2.—The spleen is rotated on its longitudinal axis with its anterior border lying outside the left edge of the operation wound. The rupture on the gastric surface is now well seen. Note the tense and swollen appearance of the pedicle with its peritoneal covering owing to accumulation of blood clots inside.

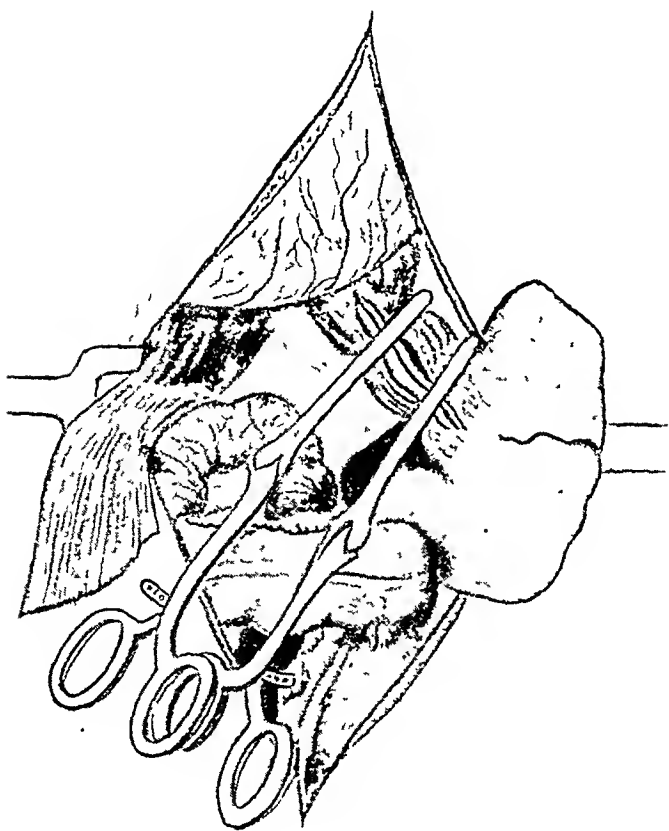


Fig. 3.—The capsule over the pedicle is opened, the clots evacuated and two clamps applied—one close to the spleen and the other immediately to the left of the commencement of the splenic ligaments.

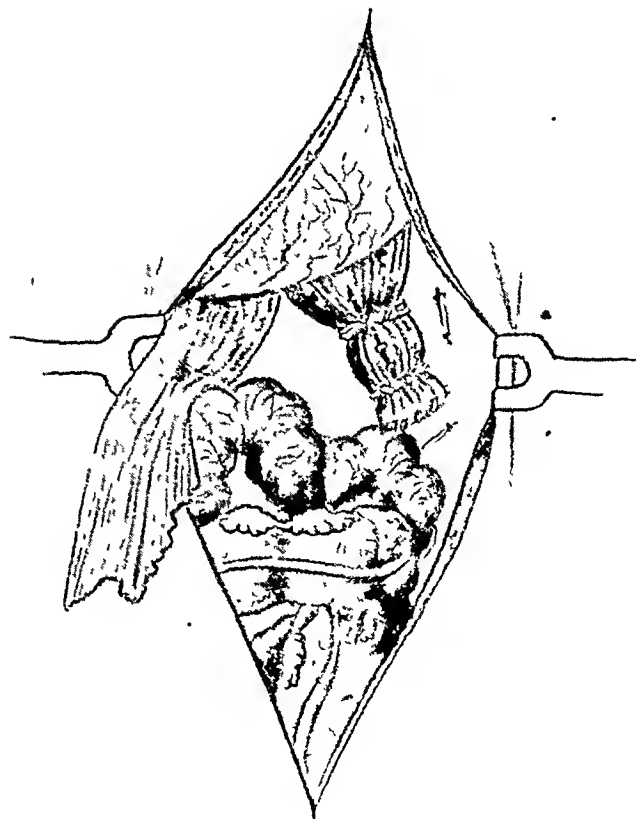


Fig. 4.—The spleen is removed, the stump of the pedicle is peritonized and the divided adhesions are stitched up.

THE SURGERY OF THE RUPTURED SPLEEN

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The normal spleen

THE normal spleen is deeply placed in the abdominal cavity and protected from injury by its position. It is supported on all sides by important viscera among which it is wedged in. It derives its anchorage from folds of peritoneum usually spoken of as its ligaments.

The oblique longitudinal axis of this somewhat wedge-shaped gland corresponds to the 10th rib and its upper and lower limits, which correspond to the inner half of its anterior border and the outer third of its posterior border, lie behind and parallel to the upper border of the 9th and the lower border of the 11th ribs, respectively.

Its apex lies about $1\frac{1}{2}$ inches from the spinous process of the 10th dorsal vertebra and its base, a small concave and triangular area, rests on the splenic flexure of the colon and the phrenico-colic ligament at the 11th rib about $3\frac{1}{2}$ inches away from the middle line looking downwards, inwards and slightly forwards.

The anterior border sharp, notched and somewhat convex separates its superior or diaphragmatic surface from the gastric half of its inferior or visceral surface.

The posterior border rather straight, thick and rounded lies between the superior surface and the renal half of the visceral surface.

The superior surface smooth and convex rests on the diaphragm, which separates it from those portions of the left lung and pleura occupying the interval between the diaphragm and the 9th, 10th and 11th ribs with the intervening intercostal spaces. This surface looks obliquely upwards, backwards and to the left.

The inferior surface is divided into two unequal halves by a longitudinal ridge extending from the apex to the upper angle of the triangular base. It is the shape of this surface that gives the organ its wedge-like appearance. The upper and larger half of this concave surface, which looks upwards, forwards and inwards, supports a portion of the stomach while the lower and smaller half, also concave but looking downwards and medially, rests on the upper half of the anterior surface of the left kidney and occasionally on the left suprarenal gland also.

The hilus of the spleen, a longitudinal and irregular cleft on its gastric surface about $2\frac{1}{2}$ inches long through which the 5 or 6 main branches of the splenic artery pass into the substance of the gland and a similar number of tributaries of the splenic vein pass out, lies about $\frac{1}{4}$ inch above and parallel to the ridge dividing the gastric from the renal area of the inferior surface.

The pedicle of the spleen composed of its vessels rests partly on the tail of the pancreas.

The surgical anatomy of the spleen, normal and enlarged

The peritoneal investment of the spleen.—The spleen is completely invested by the peritoneum except for an oval area round the hilus where its blood vessels enter its substance. Here the peritoneum leaves the capsule and lies loosely over the vessels and the pancreatic tail.

The spleen therefore may be said to lie as it were in a peritoneal pouch of which the serous covering of the pedicle forms the neck.

From the gastric and renal surfaces of the spleen the peritoneum passes on to the postero-inferior surface of the stomach and the anterior surface of the kidney, respectively. The angular space left between these two diverging folds covering the stomach and the kidney is lined by a portion of the peritoneal diverticulum, which forms the omental bursa.

In this way is the spleen attached to the stomach and the kidney by two separate double folds of peritoneum, known respectively as the gastro-splenic and the lienorenal ligaments.

As mentioned before, the triangular base of the spleen rests on the peritoneal shelf, the phrenico-colic ligament, a fold of peritoneum reflected from the splenic flexure of the colon to the left lateral abdominal wall at the 11th rib.

The splenic peritoneal ligaments do not interfere with its rhythmical expansion and contraction nor hamper the temporary increase in its size during digestion, nor its permanent enlargement due to disease.

Under normal conditions, it is possible to pass one's hand round the spleen, i.e., between it and the viscera that surround it.

The cone-shaped peritoneal space, having its base at the hilus and the bare area of the spleen immediately surrounding the hilus and its apex at the point where the splenic peritoneum is reflected over the stomach and the kidney, is occupied by the tail of the pancreas, the lienal vessels and their main branches, as described above, and is capable of considerable distension without tearing as seen in rupture of the spleen when it is often filled and distended with clotted blood.

If a coloured fluid is introduced under pressure through a small opening in the peritoneum over the splenic pedicle, the fluid will be seen to pass through the folds of peritoneum forming its ligaments in the direction of (1) the postero-inferior surface of the stomach where it is soon stopped, and (2) the lateral half of the anterior surface of the left kidney. In the latter situation the peritoneum from over the kidney is more easily lifted up and the fluid may descend along the lateral border of the kidney to the retroperitoneal space behind the descending colon.

In the case of a diseased and enlarged spleen the peritoneum over the kidney is on the stretch and is still more easily raised and enables the fluid to pass into the post-colic retroperitoneal space.

In severe injuries to the spleen the hæmorrhage is partly intracapsular and partly extracapsular. The intracapsular hæmorrhage passes in a similar way through the peritoneal sheath covering the pedicle and between the leaves of the splenic ligaments to the retroperitoneal area behind the descending colon.

Except at the hilus where the spleen capsule, which is described later, is invaginated into it along the blood vessels entering it, the peritoneum is inseparably adherent to the capsule. The spleen is kept in place not only by its peritoneal anchorage but also by the stomach and the kidney pressing it against the diaphragm. Thus a moderate enlargement and increase in weight are not sufficient to dislodge it from its position.

When, however, a spleen is considerably enlarged and heavy there is a risk that its weight and the physical exertions of the individual will dislodge it from its position. When this happens it is rotated through a semi-circle on its antero-posterior axis and is suspended by its pedicle with the diaphragmatic surface looking downwards, the anterior border obliquely directed forwards from left to right, and the base directed downwards and to the right. The pedicle may be still more stretched and lengthened, on account of the increasing weight of the spleen; the organ may descend into the pelvis or even wander about in the abdominal cavity in response to the changes of position of the patient.

The rarity of such an occurrence in Bengal, where spleens greatly increased in size are so very common, is due to the gradual enlargement of the gland and to its contracting firm adhesions with the diaphragm as a result of perisplinitis at an early stage.

Ordinarily, however, the diaphragmatic surface and the anterior border, on account of the enlargement, come to the surface by displacing the colon and the

coils of the small intestine and occupy the whole of the left hypochondriac space from its anterior to its posterior wall. The base descends into the left lumbar region and the notched anterior border also follows the base in its descent; here they may be easily palpated and the movements upwards and downwards of the spleen in obedience to the respiratory excursions of the diaphragm appreciated.

The mechanisms of rotation and of rupture of an enlarged spleen

The mechanism of the descent of the enlarged spleen, which occupies the whole of the left hypochondriac region from its anterior to its posterior wall, involves a rotation on its antero-posterior axis to descend into the lumbar region past the constriction at the waist below the 12th rib.

This rotation changes the direction of the longitudinal axis of the spleen from an oblique to a more or less perpendicular position, and thus places its anterior border at right angles to the anterior costal border.

The enlargement of the spleen extends uniformly in all directions and as a result its anterior border often curves over even the anterior surface of the stomach sometimes almost completely separating it from the anterior abdominal wall on the left.

Rupture of the spleen is caused by the anterior costal border being driven into its anterior border. Hence the tear always lies across the spleen and passes between the bundles of the circularly disposed muscle fibres of its capsule. It may extend both ways into the gastric and diaphragmatic surfaces, but usually it extends more on the latter than the former, because of the superficial position of the diaphragmatic surface and its direct contact with the lower ribs anteriorly.

Owing to the enlargement, descent, and rotation of the spleen, its pedicle is not only lengthened and its direction changed from the transverse to one downwards and outwards, but it also loses contact with the tail of the pancreas, which does not accompany it in its descent.

Occasionally, however, when the spleen is not greatly enlarged the pedicle may still maintain its contact with the pancreatic tail and even contract firm adhesions with it difficult to separate.

The splenic vessels

The splenic artery is a branch of the celiac artery. It passes to the left along the upper border of the pancreas in a remarkably tortuous manner behind the stomach and the omental bursa and reaches the hilus of the spleen between the folds of the lienorenal ligament. Here it divides into 5 to 6 branches, which enter the spleen substance through the hilus.

The subdivisions of these branches, which are end arteries and are distributed along the transverse axis of the spleen, escape injury in any rupture of the spleen that passes across its anterior border and therefore parallel to them.

The splenic vein has a similar horizontal course from left to right across the abdomen. It is straight and not tortuous, and lies below the artery and behind the posterior surface of the pancreas, where it is subject to considerable pressure when the stomach is full and presses back the pancreas posteriorly.

It joins the superior mesenteric vein at right angles to the latter behind the neck of the pancreas and is therefore placed at a great disadvantage in draining into it specially during periods of active digestion when the superior mesenteric vein is engorged with blood.

At the hilus of the spleen, where it is formed by 5 or 6 tributaries, and in the pedicle, the splenic vein with the splenic artery lies on the tail of the pancreas, which is posterior to them in this situation.

The main tributaries of the splenic vein in the spleen pulp are disposed like the arteries on the transverse axis of the gland.

The short gastric and the left epiploic branches of the splenic artery are given off at the apex of the V-shaped junction of the gastro-splenic and lienorenal ligaments; they pass between the folds of the former to be distributed to the stomach and do not in any way interfere with an operation for splenectomy.

Structure of the spleen

Besides its serous covering the spleen may be said to consist principally of a fibro-muscular capsule, a supporting framework of reticulated tissue inside the capsule and the spleen pulp made up of blood and various types of cells, which fill in the interstices of the reticulum.

The capsule is strong, and is composed mainly of elastic tissue and unstriated muscle fibres, which are circularly arranged round the longitudinal axis of the spleen and on account of their elasticity are normally capable of considerable expansion without rupture. The capsule is invaginated through the hilus over the blood vessels entering the hilus. Processes of this capsular tissue passing from the inner surface of the capsule and the surface of the blood vessels divide the spleen into small trabeculae. These trabeculae are further subdivided into a fine, microscopic reticulum by the reticular cells with processes radiating from their cytoplasm.

The branches of the splenic artery on entering the spleen divide and subdivide. The subdivisions lie in the direction of the transverse axis of the spleen and do not anastomose with each other, but gradually getting thinner and smaller in size end in cones of minute twigs, which lose their arterial walls and

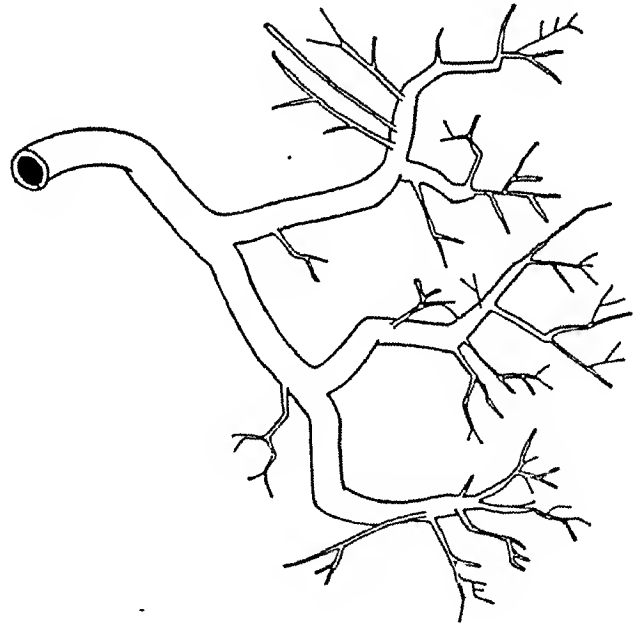


Diagram of a dissected specimen of splenic artery in the Anatomical Museum of the Vienna University showing the transverse and parallel directions of the main branches of the artery, which do not anastomose and which terminate as minute end-arteries.

retain only the endothelial coats. The endothelial coats soon get fenestrated and bulbous and are finally merged in the reticulum of the spleen pulp.

The splenic vein commences in the same way as the artery ends, that is, as pencils of minute tributaries, which have a fenestrated appearance as they are formed from endothelial cells, which seem to be derived from modified connective tissue corpuscles. These fenestrated endothelial tubes soon acquire a covering and are formed into small veins, which by coalescence form larger and larger ones and finally leave the spleen at the hilus as the 5 or 6 main tributaries, which anastomose to form the splenic vein immediately on their exit from the spleen.

Although the main tributaries of the vein inside the spleen lie along its transverse axis like the arterial branches, they, unlike the latter, anastomose with each other to a great extent.

The coats of the arteries are surrounded by lymphoid tissue, which at places is concentrated into definite nodules.

The nodules are known as the Malpighian corpuscles and are visible as small whitish specks to the naked eye.

In the meshes of the reticulum the arteries empty their contents.

Functions of the spleen

The normal functions of the spleen are stated to be (1) storage of iron, (2) beginning the formation of bilirubin from hæmoglobin, (3) filtration of bacteria and protozoal parasites, (4) manufacture of antibodies and lymphocytes, and (5) reduction or destruction of erythroblasts.

But it is with the structural peculiarities of the spleen, its rhythmical expansion and contraction, and the mode of circulation of blood in it that we are mainly concerned.

Circulation in the spleen

Blood entering the spleen through its arteries first passes into the splenic reticulum through the inter-endothelial open spaces in the bulbous ends of the terminal branches of the arteries and is finally poured into the boggy mass of the spleen pulp by the abrupt opening of these branches in its midst.

Thus there is a sudden considerable fall of blood pressure and slowing of the circulation in the spleen, a condition for which there is no parallel in any other organ or tissue of the human body.

The increased density and viscosity of the blood, due to its admixture with numerous cells of various types present in the spleen pulp with its reticular framework, cause a further retardation of circulation through the spleen.

This abnormal stagnation of blood would be impossible to overcome by the ordinary mechanism of circulation if it were not for the elastic and contractile character of the spleen capsule, its trabeculae, and the splenic rhythm, which help to overcome the inertia and maintain a constant, but greatly retarded, venous flow through the spleen.

Circulation during digestion

During periods of active digestion the spleen is enlarged in size on account of an increase in the flow of arterial blood and a further decrease in the rate of venous blood flow. In the earlier stages of digestive activity a greatly increased volume of arterial blood is distributed in the digestive tracts and glands. In this distribution the spleen has its share. But while the arterial flow is increased the rate of venous flow in the spleen is not only not increased but, as the process of digestion proceeds, is further retarded by congestion in the portal system on account of the superior mesenteric vein bringing back to the portal vein a much larger volume of venous blood than usual.

The splenic vein joining as it does the superior mesenteric at right angles to the latter and lying behind the pancreas and the stomach is placed at a great disadvantage in emptying its contents owing not only to the congestion referred to above but also on account of (1) the direction of its venous blood current at right angles to that of the portal vein, and (2) the pressure exerted on it by the now active pancreas and the full stomach.

The splenic rhythm now fails to overcome the obstruction sufficiently to maintain the ordinary rate of venous outflow from the spleen and enable it to retain its normal size. We have therefore an increase in its size and a temporary venous congestion physiological in character with a rise of blood pressure inside it above its normal.

Its sluggish circulation, the greater density and viscosity of the blood in its pulp and the presence in this blood of the products of the cells destroyed or disintegrated in it render the loss of blood a very slow process in rupture of the spleen.

To the same factors may also be attributed a quicker coagulation than normal of the effused blood within the spleen capsule, round the spleen, and in the retroperitoneal space with which its capsule communicates.

Pathology of the rupture of an enlarged spleen

By an enlarged spleen is here meant a spleen which is suffering from a chronic enlargement due to a chronic inflammatory process, the result of such pathological conditions as malaria and kala-azar.

The enlarged spleen while retaining its shape may attain many times its normal size; there is a proportionate increase in weight. A spleen removed by me 5 to 6 hours subsequent to its rupture weighed seven pounds after removal.

Its relations to other viscera remain unchanged, though it may push the costal arch forward and outward on the left side, and present its base and anterior border several inches below the arch.

While the size of the splenic artery and its branches, which enter the hilus, are but moderately increased there is a compensatory dilatation of the vein proportionate to the increase in size of the spleen and it may attain as much as four times or more its normal size.

The splenic dullness, which normally can be outlined by percussion posteriorly, is now well marked over a large area anteriorly also.

These changes in size and weight of the spleen, distressing as they are to the patient on account of the pressure exerted by them chiefly on the stomach, lungs, and the heart, would add to the difficulties of its removal, were it not for the adhesions with the diaphragm and the neighbouring viscera as a result of perisplenitis. Thus it may be found adherent to the stomach, the colon, and to the diaphragm; the kidney, however, always escapes.

The extent of such adhesions varies considerably and so does the difficulty of removal of the spleen. The capsule and the trabeculae are also hypertrophied in response to the enlargement.

It is difficult to imagine therefore that an enlarged spleen may rupture spontaneously. I never found a case of rupture where careful inquiry failed to elicit a definite history of injury.

The frequency of rupture of an enlarged spleen, I believe, is due chiefly to its accessibility as compared to the normal spleen. The enlarged spleen, lying next to the parietes and immediately behind the lower ribs with its anterior border and base frequently descending beyond the left anterior costal border at right angles to it, is exposed to trauma.

This view is supported by the fact that the seat of rupture is always at its anterior border, which is most accessible to trauma. The further fact that most often the injury to the spleen pulp is deep and extensive and out of all proportion to the tear in the capsule proves that the hypertrophied capsule even under such abnormal conditions is resistant to violence.

Next to accessibility, its semi-solid consistence held in by its capsule renders it more liable to rupture than the hollow viscera in its neighbourhood.

Thus it is rather the exception than the rule to find any serious injury to any other neighbouring viscus to be associated with the rupture of an enlarged spleen.

A study of the nature of the injury which caused rupture in 19 cases of enlarged spleen that came under my care showed direct violence in some form or other to have been responsible for them all.

The nature of the injury in the order of frequency was as follows:—

1. Knocked down by a motor car.
2. Knocked down by a bullock cart.

3. Kicked by a man.
4. Kicked by a horse.
5. Blow with the fist over the spleen.
6. Fall from a tree in the prone position.
7. Fall of a load on the abdomen.
8. Fall of a heavy load on the back which doubled up the patient driving the lower ribs into the spleen.

The history of each patient and the nature of the violence sustained by him, which in every case acted directly over the enlarged spleen lying partly in the left hypochondriac and partly in the left lumbar regions, showed that the rupture was caused by the anterior halves of the lower ribs or the left anterior costal border having been driven into the anterior border of the spleen.

The lower ribs (8th, 9th and 10th), owing to their articulation posteriorly with the bodies and transverse processes of the vertebrae to which they are connected by powerful ligaments and their attachment anteriorly by single facets and thin ligamentous bands to each other's cartilaginous ends, have only a slight, rotatory movement at the neck in their longitudinal axes, but enjoy considerable freedom of movement and elasticity anteriorly.

Thus when they are driven backwards by force against the anterior border of the spleen across which they lie one or more tears in the capsule are produced, some trabecular bands are torn and the spleen pulp is more or less crushed or contused.

The rupture of the capsule may extend on either side of the anterior border to the gastric and the diaphragmatic surfaces. Rarely is there more than one line of rupture and, although the depth to which it apparently encroaches into the spleen substance varies, the intracapsular laceration of the pulp all round the tear is usually considerable. This laceration or contusion of the pulp is caused by the impact on the spleen of the blunt agent of the violence, which drives in the rib or ribs before it.

I have seen only one example of intracapsular laceration of the pulp without an external tear in the capsule. There was only an indentation on the anterior border but considerable retroperitoneal hæmorrhage.

The abdomen was opened because of the symptoms of rupture. No intraperitoneal hæmorrhage was found but an examination of the spleen showed intracapsular clots over the gastric surface in the region of the hilus. While the spleen was being removed extensive extravasation of blood in the retroperitoneal space behind the descending colon was discovered and evacuated.

The stomach, the colon, and the ileum, which are in close anatomical relationship to the spleen, are very rarely injured. The explanation of this immunity lies in the facts that they are all hollow, elastic and compressible viscera, which lie protected under cover of the enlarged spleen, which displaces them from the surface, itself encroaching on the surface areas previously occupied by them.

Equally immune is the spleen pedicle. Except in very severe and rare crushing injuries of the thorax and the abdomen when other vital organs besides the spleen, such as the liver and the lungs, are also seriously injured leading to almost instantaneous death, the pedicle always escapes injury owing no doubt to its deep situation and the protection afforded it by the enlarged concave gastric surface and the overhanging anterior border.

Hæmorrhage in rupture of an enlarged spleen

Hæmorrhage after rupture of an enlarged spleen is very slow for the following reasons:—

1. The low pressure of blood in the spleen pulp.
2. Reflex and spasmodic contraction of the capsule after the injury narrowing the openings of the trabecular meshes.

3. Early intracapsular coagulation of the extravasated blood.
4. The escape from injury of the main branches of the artery and the vein, which enter the spleen at the hilus, and lie transversely across the spleen pulp and therefore parallel to the direction of the rupture and not across it.
5. The injury to the blood vessels is confined mainly to the capillaries.
6. Suspension of the splenic rhythm.

The course taken by intracapsular hæmorrhage and the mechanism of this extravasation has already been described.

Intraperitoneal hæmorrhage first collects round the spleen in the left hypochondriac and lumbar regions and thence trickles down into the pelvic cavity and may overflow into the right paracolic gutter if not early arrested by operation.

The extravasated blood soon coagulates in lumps of various sizes, which are freely intermixed with fluid blood.

Symptoms

The symptoms of a ruptured spleen which are first to appear are shock, pain, tenderness and well-marked hyperæsthesia over the left hypochondriac region.

The clinical signs of the catastrophe are slow and gradual in their onset. Thus the cardinal symptoms of hæmorrhage, such as shifting dullness in the abdomen, pallor, changes in the rate and tension of the pulse, fall of blood pressure, shallow and rapid breathing, develop to an appreciable degree such a long time after the onset of hæmorrhage that if the surgeon waits for them for the confirmation of his preliminary diagnosis the auspicious moment for effective surgical interference will have passed.

The hesitation in coming to a decision is chiefly due to a not-unnatural expectation to find the more serious and later symptoms in the early stage of the injury. Such expectation in the inexperienced is bound to be disappointed.

Had I not followed the golden rule in emergency abdominal surgery of opening the abdomen when in doubt, even in the very first case of rupture of the spleen that I came across, several lives would have been lost, others jeopardized, and experience gained at a high cost.

Shock, although constant, varies in degree but is very seldom acute and alarming, as is usually stated in textbooks. Patients have sometimes walked into the hospital with slight assistance from friends within a short time after the injury complaining only of pain and tenderness over the left hypochondrium.

Pain, tenderness and hyperæsthesia, however, are well marked and should be the deciding factors for immediate surgical interference. Associated with them there is most often to be found an enlarged and palpable spleen. Great care and gentleness should be exercised in palpation to discover it and the patient should not be urged to increased respiratory efforts, if there is any difficulty in appreciating it on account of the presence of the reflex muscular rigidity over the left hypochondrium.

This parietal motor reflex, the spasm of the fibromuscular capsule of the spleen and the diminished respiratory excursions are helpful in retarding or even in arresting the venous oozing.

A patient brought to hospital 3 to 4 hours after the injury, by a doctor who had made a quick diagnosis and rendered first aid by bandaging the lower part of the thorax and the whole of the abdomen with a *dhoti*, showed only slight hæmorrhage on opening the abdomen although the rupture was about 2½ inches in length and about ¼ inch deep.

Where the spleen is not greatly enlarged and descends but slightly below the costal margin it may not be palpable 2 or 3 hours after the injury on

account of its decrease in size following loss of blood and the spasmodic contraction of its capsule.

Pallor by itself is an inconclusive sign as most of the patients subject to pathological spleen suffer from a varying degree of anaemia; but when it is associated with the other cardinal symptoms of hæmorrhage it is of some significance in diagnosis.

The initial fall of blood pressure due to shock is not considerable and is recovered from soon after the trauma.

Definite and appreciable softness and quickness of the pulse, except in rare instances, can only be felt from 6 to 7 hours after the injury. Thus patients brought in early to hospital often have an almost normal pulse, temperature and blood pressure.

Air hunger and restlessness are the last signs to appear and indicate the final stages of the tragedy.

Shifting dullness is not early appreciable and, although it can be perceived at a later stage of the hæmorrhage, the movements necessary to elicit it may prove injurious to the patient. The time of its onset varies in individual cases in accordance with the amount of bleeding.

An aseptic general peritonitis manifested by well-marked but not excessive rigidity of the whole of the abdominal wall and obstinate constipation may develop 24 hours after the injury if the patient is still alive. Even at this stage pain is chiefly localized at the left hypochondrium and is only slightly diffuse.

This symptom was well seen in a boy of eight, who sustained a rupture of the spleen as the result of a fall from a tree in the prone position. The hæmorrhage was slow and the symptoms though definite were not alarming at any stage and the boy's mother, a widow, at first refused permission to an operation on her only child. General abdominal rigidity without much pain was definitely perceived after 24 hours. The rigidity and the obstinate constipation persisted until the abdomen was opened 72 hours after the injury and the effused blood, which was distributed all over the peritoneal cavity with a lot of clots in the pelvis, was quickly aspirated and sponged out and the spleen removed.

The child's bowels moved with a small soap-water enema 8 hours after the operation and thereafter naturally and normally. The recovery was uneventful.

There was a small shallow tear about half an inch long and about an eighth of an inch deep over the anterior border of the spleen. Any clot, which might have sealed the rupture, was not visible when the spleen was examined after clearing out the peritoneal cavity. It was about twice its normal size.

A consideration of the symptoms as described above leaves no doubt as to the need for immediate surgical interference.

Acute pain, tenderness and hyperæsthesia over the left hypochondrium immediately following an injury of that region in a patient suffering from enlarged spleen or in a patient with a history of malaria or kala-azar form sufficient justification for an exploratory laparotomy. We should not await the advent of the late symptoms, if we wish to save the patient's life.

In 18 out of 19 cases that came under my care the diagnosis was made on the early symptoms and spleenectomy performed immediately. The patients all came to hospital within 4 to 6 hours after the injury, survived the operation, and had uneventful recoveries.

In the one case in which death followed the operation, the patient was a boy of 12 whom I saw 18 hours after the injury and after practically all the fatal symptoms had developed. Even his life possibly could have been saved if an immediate blood transfusion had been possible.

Treatment

In every abdominal catastrophe first aid and immediate and careful removal of the patient to hospital are of prime importance, and, if carried out by the

attending physician, profoundly modify the prognosis of the case.

In suspected rupture of the spleen, the abdomen should be carefully bandaged over a pad with the knee and hip joints in a flexed position. The bandage should be efficiently and tightly put on. Commencing from the xiphoid process and lower part of the chest, it should extend down to the symphysis pubis. This not only limits respiratory excursions and diminishes pain due to movement to a minimum, but also helps to arrest the hæmorrhage by increased pressure on the spleen, which is already contracted as a result of the trauma. The effused blood is held in round the spleen in the left hypochondrium and coagulation is accelerated.

The patient should be placed on his back with the body in a slanting position, the head being on a lower level than the feet, i.e., in a moderate degree of Trendelenburg position.

The question of administration of morphia is a difficult one to decide. If the attending doctor is a surgeon or experienced in surgical diagnosis and is sure of his finding, he will be justified in giving a hypodermic injection of a $\frac{1}{2}$ grain of morphia, especially if the patient has to be carried over a long distance to hospital and some time must necessarily elapse before he can reach it.

If, however, the patient can be quickly taken to hospital, it is best not to give any morphia as it masks the symptoms of pain, tenderness, cutaneous hyperæsthesia and the motor reflex.

When possible, slow subcutaneous infiltration of normal saline in the chest or the axilla should be given at once. This does not raise the blood pressure even if pushed to the extent of 2 pints, but on the contrary helps in the recovery from shock and counteracts the effects of loss of blood from hæmorrhage. This is seldom done, but on the rare occasions when it was, I found the patient a much better operative risk, because of the practically normal condition in which he was brought to hospital, in spite of the severe injury to his spleen.

If this has not been done, as is usually the case, no time should be lost in administering saline immediately the patient arrives in hospital.

Morphia should be administered as soon as the diagnosis is made. I have always given $\frac{1}{2}$ grain of morphia hypodermically without atropin in all my cases without any ill-effects. The patient, unless he is an opium-eater, goes to sleep in a few minutes.

Anæsthesia

I have found one per cent novocaine infiltration anæsthesia in successive layers of tissues as the operation proceeds, with the preliminary dose of morphia administered hypodermically 15 to 30 minutes before the operation, quite sufficient.

In nervous patients, who insisted on a general anæsthetic, a few whiffs of ether in addition were all that I found necessary.

Novocaine infiltration should extend for 3 inches laterally on each side of the line of incision along its whole length. I have often injected 250 to 300 c.cm. of the fluid with highly satisfactory relaxation and no subsequent harmful reaction of any kind.

However, spinal anæsthesia administered at a suitable level by an experienced anæsthetist I consider to be the best.

Position of the patient on the operation table

The best access is obtained by placing the patient in a reversed Trendelenburg position at an angle of 45 degrees with the table and with a similar inclination to the right.

This position drags the heavy, enlarged spleen downwards and towards the middle line and removes the intestines away from the site of the operation. Sand-bags should be so placed under the left loin as to arch the hypochondrium forwards.

The operation

The only incision used by me is a straight left paramedian incision about half an inch from the middle line, extending from as high a point on the left side of the subcostal angle as possible to 3 inches below the umbilicus.

With the position of the patient as described and complete relaxation of the parietal muscles on either side of the incision due to novocaine infiltration, very good access is obtained with suitable retractors.

As one dissects down to the peritoneal cavity nothing abnormal is generally noticeable, except occasionally the rupture of a few muscle fibres, until the peritoneum is reached when its tell-tale purple discoloration is at once seen.

On opening the abdomen there is a rush of blood whose venous character is at once apparent. Usually the pelvic cavity is found full of clots mixed with a little fluid blood. In the left paracolic gutter the situation is somewhat similar, but the spleen is generally drowned in fluid blood and only a few clots are seen near it.

The retroperitoneal spaces communicating with the hilus as well as the hilus itself are most often packed with coagulated venous blood.

Unless there is a considerable effusion of blood within a short time due to an extensive rupture deep in character or unless the patient has been made to move from side to side to elicit shifting dullness, as is unfortunately often done, the right side of the abdomen is found free from blood if it is opened within 3 to 4 hours after an injury.

In none of these cases did I find any injury to any other viscera associated with the rupture of the spleen.

All blood and clots are quickly removed by aspiration and with the help of large, warm sponges by an assistant.

In the meantime the surgeon should feel for the hilus, which is easily found, and press on the pedicle with the left hand, while with the right hand he searches for the rupture on the anterior border, as it generally extends both ways, i.e., towards the gastric and diaphragmatic surfaces from this border. The tear can easily be distinguished from the notches by its rough surface and its extent, although it lies parallel to them.

As soon as visibility is secured by the removal of blood and clots the pedicle should be handed over to the assistant to control while the surgeon continues his examination of the spleen and its surroundings.

Adhesions, of varying degrees, to the stomach, diaphragm and colon are always found, and prevent not only the rotation and evisceration of the spleen, but also render the use of clamps on the pedicle difficult or even impossible.

While the assistant stands to the left of the surgeon, both being on the right side of the patient, exercising what pressure he can on the pedicle, the surgeon divides the adhesions between clamps. When they are all cut through and the spleen is at last free, the assistant goes to the left of the patient and firmly grasps the spleen with a towel. The spleen is now rotated backwards by the assistant on its long axis to curve its pedicle forwards and two large curved clamps are easily applied on the generally abnormally long pedicle with the right hand of the operator, while with the left hand he firmly grasps it at its farthest right-hand extremity.

One clamp is applied flush with the hilus and the other an inch or so away from it to the right. As I have already said an enlarged spleen with its more or less elongated pedicle easily permits this.

I have never brought the spleen out of the abdomen. It is often too large and heavy to be safely manipulated out without the risk of serious damage to the pedicle.

Generally the pedicle is so broad and thick, owing to the enlargement of the veins and the stretching of

the peritoneum over it by adhesions and due also to a collection of clots inside the peritoneal sheath of the pedicle, that it is expedient to use two pairs of forceps instead of one at each of the two points indicated, one being applied from above and the other from below.

A preliminary incision of the sheath over the hilus and the pedicle anteriorly, to expel the clots and separate the pancreatic tail from the pedicle when necessary and possible, can be easily effected and is helpful in the efficient application of the clamps.

The tail of the pancreas lies behind the lower border of the pedicle and is easy of access. If it is firmly adherent to the pedicle, its sheath and the spleen, the right-side clamp or pair of clamps should include in its grasp both the pedicle and the tail of the pancreas.

The spleen is removed by cutting through the pedicle to the left of the pair of forceps nearest to the hilus, but the incision has sometimes to be made through the spleen substance.

The pedicle is tied with two stout chromic gut ligatures, transfixed and applied one between the clamps and the other in the immediate proximity to and to the right of the clamp placed nearest to the middle line of the body, and the clamps are taken away. The cut end of the pedicle is covered by peritoneum, as well as the circumstances allow.

The divided perisplenic adhesions on the stomach, the diaphragm and the colon are now tied with catgut, or, if long, as they often are, their cut edges are brought together quickly by continuous sutures, and the clamps removed.

When of necessity the tail of the pancreas has to be clamped and later on tied, no ill-effects are produced. I think the only danger of tearing it or cutting into it, is in trying to separate the intimate adhesions by blunt dissections or by excising them with a knife or a pair of scissors. The adhesions of the tail are generally very close and firm.

I never wasted time in attempting to tie the blood vessels separately.

It was my usual practice to leave a pint of sterile normal saline solution in the pelvic cavity before closing the abdomen, which was done in the usual manner in layers without drainage.

Some particulars of the cases operated upon

There were 19 cases in the series with one death. The ages of the patients were from 8 to 42; they were all males.

The average time taken to perform the operation was 25 minutes.

Every one of the patients gave a history of suffering for a long time either from malaria or kala-azar.

In 11 out of the 19 cases there were retroperitoneal hemorrhages.

In 16 cases the operation was performed 4 to 8 hours, in two cases more than 18 hours (of these one died), and in one case about 72 hours after the injury. In this last instance the patient survived the operation and made a good recovery.

Blood transfusion was carried out in only two cases, both of whom survived the operation. I consider blood transfusion unnecessary if the patient is operated on early.

The convalescence in those cases that survived the operation was rapid and uneventful. The removal of the diseased spleen seemed to bring about a rapid recovery.

The cases were not followed up, but two of the patients, who came to see me over a year after the operation were in perfect health and stated that they were enjoying much better health after the operation than before it.

Unfortunately systematic examinations of the blood prior and subsequent to the operations were not carried out and hence no statement as to blood changes can be made.

The following is a summary of the special features in the anatomy, pathology, symptoms and treatment of the rupture of an enlarged spleen.

1. An enlarged spleen is most exposed to trauma on account of its superficial position lying as it does next to the parietes in the left hypochondriac and lumbar regions. In fact it forms the most prominent abdominal landmark of a person suffering from chronic malaria or kala-azar.

2. It fills in these spaces from the anterior to the posterior wall and in its descent rotates round its antero-posterior axis to get past the constriction of the waist at and below the 12th rib, and lies in its new position with its anterior border across the left anterior costal border.

3. The constancy of the situation of the rupture across the anterior border is due to its being the anterior-most part of the spleen lying across the lower ribs, which are driven into it by direct violence.

4. The contusion or laceration of the pulp is generally extensive and out of all proportion to the

superficial extent of the rupture and is caused by the impact of the blunt instrument of the force, which follows the ribs.

5. The extreme rarity of any injury to any other viscera being associated with the rupture of an enlarged spleen.

6. The usual slow progress of the hæmorrhage.

7. The frequency of retroperitoneal hæmorrhage and the channel through which it takes place.

8. The slight degree of initial shock.

9. The development of the serious symptoms 6 to 12 hours after the injury is sustained.

10. The importance and benefit of first aid, which greatly improves the prognosis.

11. The importance of diagnosis on the initial symptoms.

12. The need of immediate operation, and its success in saving the patient's life, if performed early.

13. The need of quickness in the operative procedure.

Medical News

FIFTEENTH INTERNATIONAL PHYSIOLOGICAL CONGRESS, LENINGRAD-MOSCOW, 9TH TO 17TH AUGUST, 1935

According to the decision of the Fourteenth International Physiological Congress in Rome, the Fifteenth International Congress will be held in the U. S. S. R.

The Congress will take place in Leningrad and Moscow, 9th to 17th August, 1935.

The Committee will provide board, lodging, etc., for all the members of the Congress and dependent members of their families. Arrangements will be made for trips and visits to several parts of the country at reduced rates. In order to avoid any delay with visas, and to procure the best conditions of life and work for the members of the Congress, all the physiologists intending to take part in the Congress are requested to enlist as soon as possible.

The membership fee, Rbls. 10 = 131 Francs 34 Centimes Gold, should be forwarded to the following address: The State Bank of the U. S. S. R., Moscow, Current Account No. 7005 of the Committee of the Fifteenth International Physiological Congress. The cheque can be drawn in any currency according to the exchange rate of the day. Name and address of the sender should be given to the bank.

Detailed information as to the programme of the Congress, life conditions, trips, etc., will be issued in the near future.

Please address mail concerning the Congress: Leningrad, Main P. O., Box 13.

THE COMMITTEE OF THE CONGRESS.

THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

The following students are declared to have passed the D.T.M. Examination, session 1934-35.

Passed

1. Amar Jit Singh, M.B., B.S. (Punjab), Assistant Bacteriologist, Clinical Laboratory, Patiala State—Awarded the 'Chuni Lal Bose' Gold Medal, 1935.
2. Jyotirmoy Banerjee, M.B. (Cal.), D.P.H. (Cal.), Private Practitioner.
3. Hans Raj Bhambi (Rai Sahib), L.M.P. (U. P.), L.T.M. (Bengal), Sub-Assistant Surgeon, Government of Punjab.

4. Provash Chandra Bhattacharyya, M.B. (Cal.), D.P.H. (Cal.), Private Practitioner.
5. Pundarikaksha Prasad Bhattacharyya, M.Sc. (Cal.), M.B. (Cal.), D.P.H. (Cal.), Private Practitioner.
6. Swadesh Kumar Bose, M.B. (Cal.), Private Practitioner.
7. Devendra Prasad Das, B.Sc. (Cal.), M.B. (Cal.), Civil Assistant Surgeon, Government of Bihar and Orissa.
8. Ghanasyam Das, M.B. (Cal.), Medical Officer, Palasbari Charitable Dispensary, Assam.
9. Nagendra Nath De, M.B. (Cal.), Bacteriologist, Calcutta Corporation.
10. Rohini Kumar De, L.M.F. (Bengal), Assistant Medical Officer, Talap Tea Estate, Assam.
11. Laxmikantrao Ramrao Deshpande, L.M. & S. (Osmania Medical College), Hyderabad, Deccan, L.C.P. & S. (Bombay), Assistant Pathologist, Osmania Hospital, Hyderabad, Deccan.
12. Henry Victor Francis, Diploma of Medical College, Calcutta, I.M.D., Assistant Surgeon, Government of India.
13. Joseph Francis Freeman, L.C.P. & S. (Bombay), I.M.D., Assistant Surgeon, Government of India.
14. Chuni Lal Ganguli, M.B. (Cal.), D.P.H. (Cal.), Private Practitioner.
15. Govindan Sambasivan, M.B., B.S. (Madras), Private Practitioner.
16. Tarak Jiban Gupta, M.B. (Cal.), Private Practitioner.
17. Kalyan Singh Makhni, L.S.M.F. (Punjab), L.T.M. (Bengal), Sub-Assistant Surgeon, Government of Punjab.
18. Gopal Narain Khanna, M.B., B.S. (Bombay), Private Practitioner.
19. Gangigunte Krishnaiah, L.M.P. (Mysore), Sub-Assistant Surgeon, Mysore Medical Service.
20. Ujagar Singh Madnawat, L.S.M.F. (U. P.), I.M.D., Sub-Assistant Surgeon, Government of India.
21. Md. Mustafa, M.B. (Cal.), Private Practitioner.
22. Mohammad Belayet Hossain, L.M.F. (Bengal), Medical Officer, District Board, Pabna.
23. Mohammad Jalal-ud-Din, M.P.L. (Punjab), L.T.M. (Bengal), Sub-Assistant Surgeon, Government of Punjab.
24. Nawab Ali, M.B. (Cal.), Assistant Surgeon, Government of Bengal.
25. Krishnan Lal Pathak, M.B., B.S. (Punjab), Private Practitioner.

26. Pooran Singh, M.B., B.S. (Punjab), Medical Officer, Rural Dispensary, Rewat, Rawalpindi.
27. Kiran Chandra Saha, L.M.F. (Bengal), Medical Officer, European Mercantile Jute Association, Charnugria.
28. Samuel Ram Singh, L.C.P.S. (Bombay), M.S.M.R. (Punjab), Sub-Assistant Surgeon, Government of Punjab.
29. Sib Chandra Sen Gupta, L.M.F. (Bengal), L.T.M. (Bengal), Resident Health Officer, Hope Tea Estate, Dooars.
30. Khun Veo Vejabhoom, Diploma in Medicine, Chulalongkorn University, Medical Officer, Military Hospital, Bangkok.
31. Hugh Scott Dalrymple Wilson, Diploma, Medical College, Madras, I.M.D., Assistant Surgeon, Government of India.
32. William John Woodhouse, L.S.M.R. (Bengal), I.M.D., Assistant Surgeon, Government of India.

BOMBAY MEDICAL COUNCIL

The following extracts from the summary of the proceedings of the meeting of the Bombay Medical Council held on 7th February, 1935, are published for information :—

The Council considered the application of Mr. K. P. Deshpande, a medical practitioner at Panvel, Kolaba District, for the registration of his name under section 7 (3) of the Bombay Medical Act, VI of 1912, and resolved that, before taking a decision, further information should be obtained from him regarding the curriculum and its length which he underwent in order to get his diploma.

The Council proceeded to consider the application of Mr. S. P. Lulla, M.B., B.S., for the restoration of his name to the Bombay Medical Register and decided that his application should not be granted yet.

The Council proceeded to ballot for the election of an executive committee for the year and, in accordance with the result of the ballot, declared the following six members elected :—

Lieutenant-Colonel Sir Jamshedji N. Duggan, Kt., C.I.E., O.B.E., D.O., etc.

Dr. D. A. D'Monte, M.D., F.C.P.S., etc.

Lieutenant-Colonel W. C. Spackman, F.R.C.S., I.M.S.

Dr. Mangaldas V. Mehta, O.B.E., F.R.C.P., etc.

The Honourable Khan Bahadur Dr. Sir Nasarvanji Choksy, Kt., C.I.E., M.D., F.C.P.S., etc.

Dr. Rajabally V. Patel, M.D., F.C.P.S.

The Council resolved that the visitors appointed last year to visit professional examinations should be continued as such and, as regards the examinations to be visited by them, the attention of the executive committee should be drawn to rule 111 of the Rules of the Council.

The Council proceeded to consider the suggestion made by the Local Government, viz, that, as the question of restricting the practice of medicine and dentistry in India to the nationals of India is a matter affecting the whole of India and therefore more appropriate for the consideration of the Government of India and the Medical Council of India, it should be taken up with those authorities, and it was resolved that this suggestion should be accepted and the Government of India and the Medical Council of India addressed accordingly.

The Council considered a proposal made by the executive committee for the appointment of a sub-committee to revise the 'warning notice' and the 'Code of Medical Ethics'. A sub-committee was appointed accordingly for the purpose.

The Council took up the re-consideration of the conduct of Mr. Ganpat Subrao Kasyapi, L.M. & S.,

medical officer, in charge municipal dispensary, Barsi, in completing and submitting on 23rd July, 1933, *post-mortem* examination reports on 3 dead bodies received by him for the purpose on the same day from the police and answering every one of the several questions laid down in the form of report regarding the different parts, internal and external of the bodies, whereas he had actually not opened any of those bodies, so that the detailed information given by him as to the internal organs of the bodies must have been untrue to his knowledge, and thus rendering himself liable to be proceeded against for infamous conduct in a professional respect.

After hearing the solicitor representing Mr. Kasyapi, the Council decided that Mr. Kasyapi had been guilty of infamous conduct in a professional respect and directed the Registrar to erase his name from the Bombay Medical Register.

The Council proceeded to consider the application of Mr. M. T. Ramchandani, M.B., B.S., for the restoration of his name to the Bombay Medical Register and decided that his request for the restoration of his name to the Register should not be granted yet.

The Council proceeded to consider the reports received from the visitors appointed to visit professional examinations for the L.C.P.S., Bombay, last year and resolved that the attention of the College of Physicians and Surgeons of Bombay should be drawn to the deficiencies indicated by the visitors.

'CARLO FORLANINI' SCHOLARSHIPS

The Italian Fascist National Federation against Tuberculosis places at the disposal of the International Union against Tuberculosis six scholarships at the 'Carlo Forlanini' Institute in Rome.

The conditions submitted are as follows :

These competitive scholarships, of a value of 3,000 liras respectively, plus board and lodging, are intended to enable foreign medical practitioners to stay at the 'Carlo Forlanini' Institute in Rome for the purpose of following a course of studies. This stage of eight months will correspond with the academic year (from 15th November to 15th July) including the usual holiday periods.

The scholars will reside at the Institute.

The scholarships will preferably be awarded to young physicians holding a good medical qualification and who are already familiar with tuberculosis problems and who wish to improve their knowledge of this branch of medicine. Licentiatees need not apply.

The kind of work undertaken at the Institute will be subject to an agreement between the director of the Institute and the candidate.

The publication expenses resulting from this work may be defrayed partly or entirely by the Institute.

The names of candidates, accompanied by particulars as to their age, qualifications and professional experience, must be forwarded to the Organizing Secretary, King George Thanksgiving (Anti-Tuberculosis) Fund, Indian Red Cross Society, 'Sherwood', Simla, W. C., so as to reach him not later than the 1st June, 1935.

INDIAN MEDICAL COUNCIL

LIEUTENANT-COLONEL R. S. TOWNSEND, M.C., Offg. I. G. C. H., U. P., has been duly nominated by the Government of the U. P. as a member of the Medical Council of India, *vice* Colonel A. H. Proctor, D.S.O., V.H.S., resigned.

Lieutenant-Colonel P. K. Tarapore has been duly nominated by the Government of Burma as a member of the Medical Council of India, *vice* Colonel C. A. Gill, K.H.S., resigned.

BACK NUMBERS FOR SALE

We have been notified that the following volumes of the *Indian Medical Gazette* are for sale. The volumes are bound and are said to be in good condition.

Librarians or others interested should apply to the

Editor who will put them into touch with the owner. He can, however, take no further responsibility in the matter, except that he is prepared to examine volumes and to express an opinion regarding their condition on behalf of foreign purchasers.

Volumes I to LXIII (1915-1928) inclusive.

Current Topics

Passive and Active Immunization against Measles

By LAWSON WILKINS, M.D.

(Abstracted from the *International Clinics*, Vol. III, 1931, p. 267, J. B. Lippincott Company, Philadelphia)

ETIOLOGY OF MEASLES

THE cause of measles is not yet definitely known. Many organisms of various types have been described as the etiological agent but none has withstood the tests of critical investigation. In recent years Caronia has attributed measles to a minute Gram-negative filter-passing coccus, and Tuncliff and Ferry and Fisher to specific green-producing streptococci. There is considerable evidence against any of these organisms. Most workers now believe that measles is due to a filterable virus. Attempts to transmit the disease to domestic and most laboratory animals have not been entirely conclusive, in as much as the incubation period and symptomatology have not been entirely characteristic. On the other hand, measles has definitely been transmitted to man and to monkeys by the injection of small amounts of blood and by nasopharyngeal secretions. Blood used for inoculation has shown no bacterial growth when cultured on various media. Blake and Trask have transmitted the disease to monkeys by bacteria-free, filtered, nasopharyngeal washings and were able to pass it from monkey to monkey. Degkwitz and Harrison claim to have grown the virus in culture in symbiosis with the diplococcus of Tuncliff. The inoculation of monkeys with a bacteria-free filtrate of the cultures caused a febrile reaction but not a typical rash and rendered the monkeys immune to subsequent infection with measles.

PASSIVE IMMUNIZATION

Convalescent serum—Although convalescent blood serum was used for the treatment of measles by Weisbecker in 1895, Conci was apparently the first to employ it for immunization in 1901. In 1918 Nicolle and Conseil published their results in the protection of exposed susceptibles and in the same year Richardson and Connor used it to control a hospital epidemic in Providence, R. I., and Park and Zingher tried the method but did not publish their results until 1924. After Degkwitz, in 1920, described his experience in 700 cases, the method soon became used more generally and since this time a voluminous literature has appeared.

Debre and Joannon and others have shown that in patients convalescent from measles the maximal concentration of antibodies is reached from the seventh to the tenth day after the fall of the temperature. After this there is a gradual decline in the antibody strength of the blood but a point is reached at which the strength remains comparatively constant—perhaps for the rest of life. It is, therefore, best to prepare the serum from the blood of a patient taken the seventh to tenth day after defervescence. The donor should be free of tuberculosis and have a negative

Wassermann test and the blood should be cultured for sterility. If desired, the serum may be passed through a Berkfeld filter. The serum may be preserved with 0.2 to 0.5 per cent phenol, although this renders the serum turbid. Recently Merthiolate in a concentration of 1:10,000 has been used as a preservative and causes no clouding. Kept in a refrigerator, it retains its potency for at least nine months and probably for two years.

If the serum is injected intramuscularly in doses of 35 cc to 10 cc during the first five or six days after exposure, it will completely protect a large majority of children and partially protect nearly all the others. When the serum is given between the sixth and ninth day of the incubation period, complete protection is not afforded but the disease occurs in a modified or attenuated form. After the ninth day the serum has no effect. The attenuated form of measles presents a striking contrast to the usual form. In some cases nothing is noticed except a few scattered pinkish macules. Usually the incubation period is prolonged, often to three weeks or more. The temperature usually does not exceed 100°F to 101.5°F. The rash is scanty and resembles that of German measles. The catarrhal symptoms are absent or mild. Koplik spots are not found. Secondary complications do not occur.

Adult immune serum—The difficulty of procuring sufficient quantities of convalescent measles serum led investigators to try the value of the serum or citrated whole blood of adults who had had measles in earlier life. The fact that second attacks of measles are comparatively rare indicates that immune bodies persist in most individuals throughout life. Degkwitz in 1920 was the first to attempt passive immunization to measles by the injection of the serum of adults who had previously had the disease. Since then there have been numerous reports on the subject. Relatively large doses of adult serum—20 cc to 40 cc—are usually required to afford protection. A review of the literature shows that even with these doses favorable results are not obtained as uniformly as with convalescent serum.

Relative dosage of convalescent and of adult serum—It is difficult to state the exact dosage of convalescent serum or of adult serum which should be given to prevent or to attenuate measles. This difficulty arises because the following variables must be taken into consideration: (1) the age and size of the child, (2) the day of incubation, (3) the intensity of exposure, (4) the potency of the serum. It is stated that attenuation rather than prevention may be attained by giving either a small dose of serum early in the incubation period or a larger dose late in the incubation period. However, the latter method is more reliable and is probably preferable as offering a means of establishing a more lasting immunity. A wide variation in dosage has been recommended by different workers; for example, all the way from 25 cc. to 10 cc. of convalescent serum and from 10 cc to 40 cc of adult serum have been employed during the first five days of incubation to secure complete protection. The following table gives the

reviewer's opinion of the dosage which can be expected to yield fairly uniform results :

		Days of incubation	
		1-5 days	6-8 days
<i>For complete protection.</i>			
Convalescent serum	5-10 c.c.	Protection usually not secured.	
Adult serum ..	30-40 c.c.	Protection usually not secured.	
<i>For modified attacks</i>			
Convalescent serum	2-4 c.c.	4-10 c.c.	
Adult serum ..	10-20 c.c.	20-40 c.c.	

The variation in results would be largely overcome if there were a simple and practical method for the standardization of the potency of the serum. Such a method would be of great value especially when one is compelled to use adult serum or serum stored for a long time. It is probable that convalescent serum is comparatively uniform in its potency. However, the diversity of results obtained with adult serum by different workers indicates that it may vary considerably in its antibody content. The writer has had the opportunity to observe this on a number of occasions. He has been able to afford complete protection with as little as 8 c.c. of his own serum and yet at times has failed to obtain any modification with 30 c.c. of a parent's serum. The variability of the concentration of immune bodies in the serum of different adults can to some extent be overcome by using pooled serum from a large number of individuals. When convalescent serum is not available it is therefore preferable to use such pooled adult serum rather than the blood of a parent. If a large batch of serum is used in successive cases, the physician becomes familiar with its potency from the results obtained and can judge the dose accordingly with considerable accuracy.

DURATION OF IMMUNITY AFTER SERO-PREVENTION AND SERO-ATTENUATION

The injection of immune serum at an early stage of the incubation period in sufficient quantities to entirely prevent measles confers merely a temporary passive immunity. As in the case of other infections, passive immunity probably lasts only two or three weeks, or at the most several months. On the other hand, the occurrence of a modified or attenuated form of measles, after the injection of smaller amounts of serum, may give rise to a more lasting form of active immunity. As yet there are not sufficient data to determine how complete and how lasting is the protection afforded by such attenuated attacks. It is entirely possible that immunity may be established for life especially if it is reinforced by the repeated exposure of the patient to contagion. Certainly the children who have had attenuated measles during one epidemic are rarely if ever observed to contract the disease a second time during the same epidemic. It is of importance to follow large groups of such children in subsequent epidemics to determine whether the immunity persists. Debre states that he has followed several hundred children in successive epidemics. Many of the children who had attacks attenuated by serum in one epidemic were intimately exposed to measles in subsequent epidemics without becoming infected; whereas those whose attacks had previously been entirely prevented contracted the disease. Debre also points out that the degree of immunity varies with the extent of attenuation which has been produced. When the attenuated attack has been very mild, the immunity is only partial and the patient may subsequently have another mild attack.

The practical application of sero-prevention and sero-attenuation.—Sero-prevention and sero-attenuation each has its own place during a measles epidemic. In children's hospitals the accidental admission of an unrecognized case of measles was formerly followed

by successive crops of contact infections over periods of weeks or months, necessitating periods of quarantine and restriction of admissions. The hospital infections were not only embarrassing to the administration but were exceedingly dangerous to young infants and delicate or tuberculous children. Now every effort is made to prevent contact infections by the early administration of sufficiently large doses of convalescent serum to all patients who may have been exposed in any way. Since measles is so highly infectious, it is usually necessary to inject all the susceptible children in whole wards or in the entire hospital. In spite of the attempt to completely prevent infection, some attenuated forms of measles usually occur which are harmless but nevertheless serve as sources of further infection. Likewise, the passive immunity which has been conferred on the other children may be lost after three or four weeks. Therefore, as long as a source of infection is smouldering in the form of any attenuated cases it is necessary to inject all new admissions with serum and to reinject the other patients every three or four weeks.

In child-caring institutions such as orphanages, the situation is similar. However, if there is a relatively permanent instead of a transient population, it may be advisable to purposely expose all the children to the infection and to give the serum in attenuating rather than preventive doses. In this way a comparatively lasting immunity is established and the epidemic will have completed its course in the institution within a relatively short period.

Measles serum has its widest sphere of usefulness in the hands of the family physician and he should consider it his duty to employ it extensively. Measles is especially a family contagion. Where there are a number of children in a family, an older child of school age usually becomes infected outside the home. As a rule the parents are unaware of his exposure until the disease is under way and it is too late to give serum. Fortunately, in the older child the disease is less apt to be dangerous. If there are younger brothers and sisters, they are practically certain to contract the disease and may develop into dangerous cases. The family physician usually has the opportunity to give serum either to prevent or to attenuate the infection in these younger children. Except in the case of very delicate infants, it is preferable to regulate the dose so as to permit an attenuated infection to occur. If the disease is entirely prevented, the immunity may be very transient and after a few weeks, the child may contract the disease from a subsequent exposure in the same epidemic. The serum of a convalescent, if available, is preferable to any other. If convalescent serum cannot be obtained, the serum of physicians or nurses who have been in frequent contact with measles cases is probably the next most reliable. If neither is available, the pooled serum from a number of adults, who have had the disease, may be used. When no other serum can be obtained, the serum or citrated whole blood of one or both parents may be used, although the results are subject to greater variability than with the other methods.

In a few communities the health departments have undertaken the collection and preparation of convalescent or pooled adult serum and have made the serum available to physicians who desire it. In most communities, however, the health department has considered that too great a task, and it has been necessary for the practitioners to collect their own serum. Adults who contract the disease are eagerly sought as donors of large amounts of serum. Parents who have witnessed the benefit to their younger children from attenuating doses of serum are usually glad to permit the physicians to take 60 or 100 c.c. of blood from a convalescent older child to be used for his future cases. Laboratories are usually available for the separation and sterile bottling of the serum. However, the inconvenience of collecting repeated specimens of blood to some extent stands in the way of the more

general use of serum by the busy practitioners during an epidemic. It is to be hoped that some method of reactivation of adult serum or the preparation of immune substances from the human placenta may eventually provide an abundant and easily available source of measles antibody. A method for the accurate standardization of such preparations is highly desirable.

ACTIVE IMMUNIZATION AGAINST MEASLES

The methods which have been discussed previously have been concerned with the injection of immune bodies into children who have been accidentally exposed to measles and are already in the incubation period. It is apparent that if these methods were generally applied, especially to children under three years of age, they would reduce materially the mortality from measles. They could not be expected to affect radically the morbidity of measles or to offer any hope for the eradication of the disease. Unless some method can be devised to confer an active and permanent immunity on all children, measles will continue to recur in great epidemics, and many children will contract the disease without knowledge of their exposure, so that they cannot be given the benefit of serum during the incubation period.

As early as 1758, inspired by the practice of the inoculation of smallpox then in vogue, Francis Home undertook the inoculation of children with measles by applying to scarified areas of skin the blood taken from measles patients at the height of the disease. He claimed that in this way he produced measles in a mild form and that the children were afterwards immune to infection. As the incubation period was said to be only two days and the possibility of natural infection was not entirely excluded, the work of Home is open to question. In recent years, however, a number of methods for active immunization against measles have been suggested and are worthy of further consideration.

Active immunization by purposely infecting with measles and attenuating with serum.—As already pointed out, the sero-attenuation of measles is really a method which permits an active immunity of greater or less degree to develop as a result of a mild infection. It is applicable, however, only when one has definite knowledge of the exposure of the patient and even then one cannot be certain that the disease is being incubated. During a widespread epidemic the school children are almost certain to become accidentally infected. It would seem justifiable to purposely infect them by intimate contact with patients in the active stage of the disease in order that one might know the exact day of incubation and administer an attenuating dose of serum at the proper time. If the protective potency of serum could be standardized with sufficient accuracy, one would not hesitate to do this, provided the child's parents were intelligent and co-operative.

Different workers have actually employed a number of methods of infecting children and have simultaneously attenuated the infection with immune serum. Richardson and Connor in 1919 inoculated three children with nasal secretions of active cases and simultaneously administered immune serum. Only one child developed a mild form of measles. Zingher in 1924 produced modified measles by first swabbing the mucosa with nasal secretion and later injecting the proper amount of convalescent serum. Copeman (1927) recommends the injection of immune serum into the unaffected subject followed by an inoculation with the virus. Instead of employing the nasopharyngeal secretions as the infecting agent, Nicolle and Conseil (1923) used blood from an acute measles case. They recommended the administration of convalescent serum followed twenty-four hours later by the injection of 1 c.c. of measles blood.

Active immunization by the inoculation of infants during the period of inherited immunity.—It is generally recognized that infants under five months of

age are relatively immune to measles provided that their mothers have ever had the disease. Hermann believes that, if infants are inoculated with measles virus during this period of inherited immunity, they will develop an active and permanent immunity to the disease. Between 1914 and 1922 he inoculated 165 healthy infants between four and five months of age according to the following technique: The nasal mucus discharge of measles patients free from other diseases is taken from twenty-four to forty-eight hours before the appearance of the eruption, mixed with a small quantity of saline solution, and bacteria and other extraneous material separated by centrifugalization. A little tricesol is added as a preservative (1); and a few drops of the solution are then applied to the nasal mucous membrane of the infant to be immunized. The best results were obtained when there was some reaction following inoculation, such as a slight rise of temperature from the eighth to the sixteenth day, or a few spots on the body. Of one hundred and sixty-five infants inoculated none showed any unfavourable effects. Seventy-five of the infants were followed from four to eight years and only five or these contracted measles. Of the remaining seventy, forty-five had been exposed directly to measles infection in the same family or house. In eighty-four of the one hundred and sixty-five there was a definite reaction following inoculation consisting of a rise of temperature, with or without spots on the face and body, and none of these eighty-four cases developed the disease.

Active immunization by the injection of small amounts of virulent measles blood.—Since it had been shown that the blood of a measles patient at the beginning of the rash contains the infectious agent, Hiraishi and Okamoto (1921) attempted to induce acquired immunity to measles in forty-four healthy children by injecting small amounts of blood taken from patients just before the appearance of the rash. The doses varied from 0.0001 to 0.005 c.c. The children were later tested for immunity by exposing them to measles, smearing their throats with infectious measles secretions, or injecting large amounts of measles blood. The experiment was apparently not successful as twenty-nine of the children developed measles within the next nine weeks.

Debre and his associates have studied this method in more detail. In non-immune children two to five years of age, the subcutaneous injection of 1/800 (0.00125) c.c. of virulent blood causes an elevation of temperature of 100.0°F. to 100.4°F. between the seventh and tenth day, and an increase in leucocytes followed by a leucopenia. There are no other symptoms. However when an original dose of 1/400 (0.0025) c.c. of blood is injected, there appears on the eighth day a slight catarrh with a buccal enanthem and occasionally Koplik spots, and on the following day there is a morbilliform eruption with a slight rise of temperature to about 100.4°F. All these symptoms disappear in twenty-four to forty-eight hours without any constitutional disturbance. The characteristic blood picture is observed. If 1/800 c.c. of virulent blood is first injected, the subsequent injection of 1/400 c.c. does not cause the slight reaction. By rapidly increasing the dose injected, as much as 0.5 c.c. may be given without clinical reaction. Prior to 1928, Debre and his associates had injected 1,000 children with two doses of virulent blood in an attempt to produce active immunity. In children two to five years of age the first dose was 1/800 c.c. and the second 1/400 c.c.; in children five to ten years of age, 1/600 c.c. and 1/400 c.c. No bad results were obtained. Debre has not yet reported on the immunizing value of the method as judged by the response of the children to subsequent exposures to measles.

Comment on the present status of active immunization.—The active immunization of children against measles remains an intriguing problem. At present when children are accidentally exposed, if one has

knowledge of the exposure, it is preferable to administer serum in such a way as to secure attenuation rather than prevention of the disease, in the hope of producing more or less lasting, active immunity. In the course of large epidemics, school children are so prone to contract the disease from unknown accidental exposures, that it would seem justifiable to purposely infect them in order that one might know the exact time of infection and attenuate the disease with serum at the proper date during the incubation period. If highly effective serum of standardized potency were available this method would be generally practical. It seems doubtful whether infection by swabbing with infectious nasal secretions or by the injecting of virulent blood would offer any advantages over the natural method of infection by bringing the subject into intimate contact with a patient in the acute stage of measles. Objection to the method may be raised because of the danger of transmitting other intercurrent infections, but this objection is outweighed by the greater risk of the unrecognized accidental exposure. Of course, the prejudice of uninformed parents will probably stand in the way of the widespread application of such a method. Harmann's proposal to inoculate young infants in the stage of inherited immunity is open to more serious criticisms. The dangers of transmitting colds or influenzal infections to infants of tender age would be great. Furthermore, the results with diphtheria immunization indicate that it is difficult to produce permanent active immunity by inoculating during the period of inherited immunity. The attempts to produce immunity by the injection of sub-clinical doses of infectious measles blood is of great interest but so far there is not sufficient data to judge the success of the method.

On the basis of our present knowledge, every effort should be made to attenuate or prevent measles by immune serum in children under the age of three years, the period when the disease has a high mortality. In older children the disease should be attenuated whenever possible, and with the co-operation of intelligent parents purposeful infection and attenuation are justifiable. Whether any practical method for the general active immunization of all children can be developed is open to question. The value of the herd immunity caused by childhood infections is amply demonstrated by the disastrous results of the introduction of measles into non-immune populations, as in the Faroe Islands and elsewhere. Unless a method of active immunization could be relied upon to afford effectual and permanent protection one would hesitate to employ it to eradicate measles from a community.

Changing Concepts of Nutrition

By JAMES S. McLESTER, M.D.

(From the *Journal of the American Medical Association*, Vol. 103, 11th August, 1934, p. 383)

THE day was when, in order properly to nourish the sick person, the physician told him what he must not eat; now, he is told what he must eat. This changing concept of nutrition marks a great advance in clinical medicine.

Until a decade ago, nutrition was the stepchild of medicine. True, for generations this science has been constantly advanced by a long line of brilliant investigators from Lavoisier to Graham Lusk, but physicians have been slow to give this knowledge practical application. This lack of interest was due in no small measure, I believe, to the semicharlatanism and wild faddism which have always flourished in this field and which have led many conservative physicians to give it a wide berth. Now a reversal of feeling has taken place. The great discoveries of recent years have excited the interest of everyone, laymen and physicians alike, and to-day medical men are keenly alive to the vastly important part which nutrition plays in the prevention and treatment of disease; a radical

change in the conception of the nutritive needs of the sick person has come about. This change is explained, I believe, by the order in which, in the evolution of modern medicine, the basic sciences have developed, cellular pathology coming early and present-day physiology late. Formerly, in planning the patient's food, physicians thought solely in terms of the local pathologic condition, of the harm they might do some impaired organ; now they think chiefly in terms of general physiology, of the good they can do the patient as a whole. This transition is signally characteristic of modern thought in nutrition.

All of this was foreshadowed twenty-five years ago by a complete about face in the treatment of typhoid. As an intern I saw the soldiers ill with this disease who returned in large numbers from the Spanish-American War, and two things stand forth in my memory: the miserably small amounts of food that were given these patients, and their desperately ill state. To-day one sees a different typhoid. Now the patient is seldom very ill; the carphology and subsultus tendinum of those earlier days is a thing of the past, as is the muttering delirium, the distressing abdominal distension and the so-called toxæmia, all because Warren Coleman demonstrated that the patient with typhoid must be adequately nourished. No longer do physicians think chiefly of the pathologic changes in the small intestine but rather of the nutrition of the patient as a whole. To-day he is given much more abundant food of relatively wide variety, and as a rule he gets well.

Witness the change that has come about in the treatment of gastric ulcer. The method that long prevailed was the semistarvation plan of von Leube, until finally Lenhartz showed that the cure of almost anything is made more difficult by starvation and pointed out the fallacy of such rigid food restriction. The regimen which he instituted and which was revised for the American stomach by Sippy is of value not merely because the more abundant food has a direct influence on the stomach but also because it keeps the patient in something like nutritive equilibrium. It promotes repair.

A grievous error of the past was the dietary limitation imposed on the patient with Bright's disease. In the treatment of all forms of nephritis the physician had in mind but one object, that of sparing the kidney, and reasoned that this could best be accomplished by drastic restriction of the protein intake. Because of limited vision the effects on the kidney of the degradation products of protein metabolism were feared, and in the interest in the local changes the patient himself was forgotten. Physicians entirely overlooked the fact that food proteins which are used for replacement purposes are not degraded to their end-products and therefore can in no wise increase the burden on the kidney and, what is still more important, failed to realize that protein loss plus protein starvation must of necessity lead to a depletion of body proteins and thus eventually to a state of chronic inanition, which in turn retards all recovery.

If recovery is to be promoted, protein loss must be made good. The truth of this was first seen in the striking results obtained by Epstein when his nephrosis patients, with their heavy albuminuria, were fed large amounts of protein. Later this became still more evident through the observations of van Slyke and his associates, who found that if the plasma protein deficit of glomerular nephritis is allowed to persist the patients fare badly, while, on the other hand, if the albumin loss is made good and the blood proteins are maintained at approximately the normal level, the patients as a rule go on to complete recovery. The accuracy of these observations has been abundantly attested by McCann in the excellent results achieved when he prescribed large amounts of protein for patients with glomerular nephritis. In some of McCann's patients the improvement was graphic. From such experiences it has been learned not only

that rigid protein restriction in nephritis is bad but that if the patient is to be given the best opportunity for recovery he must be adequately nourished, and that of paramount importance is a liberal, sometimes a large, intake of protein. Here, too, the medical profession has advanced from a consideration of local pathologic change to one of general physiologic function.

In the same category until recently was the patient with vascular hypertension. He was told that he must eat no meat, no eggs. I have no doubt that the resulting protein starvation imposed an additional handicap on many persons already suffering from heavy disabilities and that much unnecessary semi-invalidism resulted. From a better understanding of nutrition it is now known that instead of this one-sided diet the persons so handicapped must have a well-balanced ration, never excessive, but never lacking in any essential, such a diet as is best calculated to preserve the greatest degree of vigour for the longest period of years.

Even more recent is the change that has come about in the conception of the nutritive needs of the patient with diabetes. The earlier understanding of this disease was that it was merely a failure of carbohydrate utilization. It was thought of only in terms of carbohydrate metabolism and the patient's food was restricted accordingly. Then came insulin; this agent has helped enormously, and while it has not solved the riddle of diabetes it has pointed the way to one important truth, that is, that the entire animal economy, not merely a single metabolic fault, must be considered. In providing nourishment for the diabetic patient it has been learned that he must get adequate amounts of every class of food, particularly of carbohydrate, the very foodstuff that was formerly restricted with such rigour.

Even in tuberculosis, views have materially changed. The ability of the patient to store fat was once thought to be the best criterion of progress, and that to bring about a condition of obesity or near obesity was the acme of good treatment. Now it is known that such a condition imposes a real handicap. It is evident from a nutritional standpoint that the greatest good for the tuberculous patient can be accomplished by a diet that is liberal but not too liberal, that is, a diet that keeps him in a state of nutritive equilibrium and approximately at his ideal weight. This, infinitely more than a condition of overweight, encourages recovery.

In chronic arthritis every variation of dietary restriction has been played on, and almost everything, at one time or another, has come under the ban. Proteins were restricted because they increase the production of uric acid; fruit and tomatoes were forbidden, strange to say, because they contain acids; and sugars and starches were limited because a few students of arthritis have concluded that lowered dextrose tolerance is a salient feature of these disorders. No satisfactory clinical evidence, however, has yet been presented to show that such restrictions, even of carbohydrate, influence the course of arthritis. The feeling is gaining ground that, except for reduction of weight in the obese, most can be accomplished in a nutritive way for arthritic patients by warning against one-sided diets and by prescribing a fairly liberal ration which carries all nutritive essentials. It is coming to be realized that these unfortunate patients are destined to be sick a long time and that they should be permitted a ration which best insures against nutritive failure.

Even the nutritive needs of infancy and early childhood are to-day viewed with a much broader understanding. Those practitioners who were taught the elaborate milk formulas of thirty years ago marvel at the wide variety of foods given infants to-day, spinach, carrots, beets, tomatoes, scraped beef, even sweet potatoes. They take almost anything and thrive.

I am tempted to hazard the prediction that this shift in the concepts of nutrition will extend to the obstetric practice of the future. That school of thought which restricts the protein quota of the pregnant woman's ration for fear of damaging the liver and thus producing eclampsia is, I believe, in error. And, too, those obstetricians who materially restrict all food in pregnancy in the effort to limit the size of the offspring and thus make labour easier are likewise, I fear, in error. During pregnancy the woman needs, more than at any other period of her life, an abundant diet which provides in adequate amounts all necessary food factors, not only carbohydrate and fat but proteins, vitamins and minerals as well. To deny her this, even in small degree, is to court disaster.

In conclusion I would call attention to the fact that these changing concepts of nutrition are not the result of vacillation or of an uncertain drift of opinion. Far from it. They express the broader understanding of man's nutritive needs that has come with the discoveries of recent years and represent the well-considered application of knowledge gained, little by little, from painstaking research and careful clinical observation. This is the way of progress.

Control of Measles

By G. HALE, M.B. (Camb.)

(Abstracted from the *Lancet*, 1st December, 1934, p. 1222)

DURING the latter part of the biennial epidemic of measles in 1931-32, the wards of the Victoria Hospital for Children were kept open by the use of either convalescent or adult serum, whichever could be obtained. There were three wards each of 18 beds, and the period covered was February to July. Susceptible children who came in contact with measles while in the wards received an intramuscular injection of serum within the first five days of incubation, complete protection being the objective. Susceptible children known to be contacts were not admitted.

A sliding scale of dosage was used—a minimum of 5 c.cm., plus 1 c.cm. for each year of life—but in a few cases it was not strictly followed. As time went on it became increasingly difficult to obtain either adult or convalescent serum, and in two cases the serum of parents was used.

The parents of the contact were sent for and the position was explained to them. If they had had measles about 50 c.cm. of blood was withdrawn from one of them, and as soon as the serum had separated from the clot an injection was given to the child. In deciding whether to take blood from one parent rather than the other, preference was given to the one who had had the more recent attack. If he or she had had two or more attacks this was taken as a sign of poor immunity. General physical fitness was taken into account, and other things being equal the younger parent was preferred. No Wassermann or other test was performed, but it was explained that syphilis contracted after the birth of the child might be transmitted by the injection. If any parental serum was left after the child had had the injection, a Wassermann test was done and it was put into ampoules for later use. In the two cases treated, the dosage used was as then advised by the public health department of the London County Council. Up to the age of three years it was 10 c.cm.; from three years onwards the number of cubic centimetres to be given was calculated by multiplying the age, in years, by four.

There seems to be no reason, in the ordinary way, why parental serum should differ at all from mixed adult serum; though presumably the results are not likely to be so uniformly good.

The value of protecting susceptible cases in hospital from measles is obvious from the accompanying table,

and the method is widely practised. The principal objections to its application in private practice are: (1) that few children are taken to the doctor during the incubation period; and (2) that the serum is hard to get. The first of these difficulties can only be overcome by wider knowledge of preventive medicine among the public, or conceivably by compulsory notification of all cases and the tracing of contacts. The second is really no difficulty at all, provided one of the child's parents has had measles. It should not even be necessary to prepare the serum, for a direct injection of whole blood from the parent should be quite as effective as an injection of serum, provided allowance is made for the volume of the clot in estimating the dose.

Date in 1932	Sex	Age	Dose in c.cm.	Day of inc.	Result
<i>Convalescent measles serum</i>					
March 19	M.	9 yrs.	10	4	Protected.
May 6	M.	3 "	8	5	"
"	F.	6 "	11	5	"
"	F.	6 "	11	5	"
"	M.	2 m'ths.	5	5	"
"	F.	20 "	5	5	"
"	M.	3 "	5	5	"
May 14	M.	21 "	5	2	Measles developed after discharge on 31st May; attack said not to be severe.
May 18	F.	11 "	3	2	Protected.
<i>Adult measles serum</i>					
April 20	M.	9 yrs.	13	4	Protected. Had had 10 c.cm. convalescent serum on 19th March.
"	F.	5 "	11	4	Died of T.B. meningitis on 23rd April.
"	F.	5 "	10	4	Protected.
"	M.	7 wks.	5	4	"
"	M.	5 m'ths.	5	4	"
"	F.	11 yrs.	16	4	"
"	F.	4 "	9	4	"
"	F.	wks.	5	4	Died of congenital syphilis on 21st April.
"	F.	7 yrs.	12	4	Protected.
"	F.	4 "	5	4	"
"	F.	18 m'ths.	5	4	Developed measles on 2nd May. Rash and fever only lasted 24 hours. No Koplik's spots.
<i>Parental measles serum</i>					
May 14	F.	2 yrs.	10	2	Protected. Pertussis, 29th May.
"	F.	4 "	15	2	Measles, 16th May (note date). Fever lasted 3 days; some bronchitis.

Inc. = incubation.

In private practice there is no object in protecting all measles contacts and leaving them susceptible again in a few weeks, but there is every reason to modify the attack by giving the injection between the sixth and the ninth day of incubation, thereby insuring against complications, severe illness, or even death.

The Place of Phrenicectomy in the Treatment of Pulmonary Tuberculosis

By J. GRAVESEN, M.D.

(Abstracted from the *British Journal of Tuberculosis*, Vol. XXIX, January 1935, p. 12)

AFTER certain exclusions the material for true statistical analysis is reduced to 153 cases.

It is now found that a permanent positive result has been obtained in 55 of these, the 98 remaining cases showing no positive indications of lasting beneficial results.

The effective results.—These figures mean that only a little more than one-third of the cases have derived lasting benefit from the operation. This, far from being reassuring, leads to an unfavourable comparison with the results obtained by other forms of surgical treatment after a similar period of observation.

A more minute study of the 55 cases with positive results further reduces the apparent efficacy of the operation. Eleven of the patients had already shown such marked improvement before the phrenicectomy was performed that one feels uncertain about the benefit accruing from the operation. In another 17 cases the patients continued to expectorate tubercle bacilli, and the whole question of improvement therefore became rather debatable.

This leaves only 27 cases where we have any right to say that the patients were healed as the result of the phrenic operation. An individual study of these 27 cases shows that they represent the most localized and the least serious affections out of the total material examined. When it is remembered that all of these patients had been living under sanatorium regime both before and after the operation, and that many of them had received other forms of treatment (e.g., sanocrysin, light treatment, etc.), one seems justified in thinking that it was in conjunction with these other methods, rather than by the evulsion itself, that the beneficial results had been obtained.

These facts verify the impression which has been steadily gaining ground in our minds during our twelve years' experience of the phrenicectomy—namely, that the actual efficacy of the operation has been greatly exaggerated by many who have written about it.

This is not meant to be a wholesale condemnation of the phrenic operation. Where definite indications are found, we believe some good may be achieved by phrenicectomy. What we wish to protest against is its indiscriminate use even where no special indications are present.

A further examination of the 'negative' group provides a forcible argument in support of this warning.

The non-effective results.—Here, too, the conclusions are the result of our deliberate and unprejudiced judgment of the 98 cases, with no lasting effect: 26 of them must be left out of consideration, as they had already shown very malignant or complicated developments. The operation was used as a last resort: it would therefore be unfair to debit the phrenicectomy with the unfavourable result. In another 18 cases the operation had been performed elsewhere before the patients were admitted here; they came for further help by surgical or other forms of treatment. As these cases represent a particular group of non-effective results, they should not be used as basis for an unfavourable estimate of phrenicectomy.

But the remaining 54 cases are a heavy weight on the debit side of this method. In all these cases the operation has reduced the respiratory function of the affected lung to a considerable degree, without any compensatory result. This fact alone deserves much more attention than has been given to it by many who have written about it.

Moreover, it must be remembered that in most cases it is the healthy lower lobe which is disturbed in its function, while the affected apical area shows

Sig.—In syrup and water, three-hourly to a child of one, and increasing doses according to the age.

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and the method is widely practised. The first of some cough may remain, and come by wider minims of the tincture, for a child among the pile (gr. 1/20) are both useful remedies. fication of ant to insure complete recovery, and a second ; ant may be required to achieve this. the most cases the course of the disease is quite straightforward but in young infants considerable areas of pulmonary collapse may follow obstruction of one of the larger bronchi by secretions. In an endeavour to prevent this, babies with bronchitis should not be allowed to remain too long in one position, and it is well to take them out of their cots and nurse them from time to time. Bottle feeds should always be given on the lap. The secretions may be so tenacious that feeble infants are unable to dislodge them and are in danger of respiratory failure. When such a collapse occurs the baby should be rapidly transferred to a mustard bath (one ounce of mustard to 1 gallon of water at 100°F.), and given brandy and other stimulants. An injection of strychnine (gr. 1/400) with adrenaline (m ii of a 1 in 1,000 solution), and Curschmann's solution (m. v) is suitable for a child of three months and can be repeated at four-hourly intervals.

BRONCHO-PNEUMONIA

Treatment.—Nursing is of primary importance, and the doctor who feels that he must do something, often does too much. Excessive medication may easily provoke vomiting and diarrhoea. The child is best nursed propped up in bed, but his position should be frequently changed. The room should be well ventilated, and in warm weather the child is best placed on a balcony, but it may be difficult to make the parents approve of this treatment. Coverings should not be too heavy; a two-piece pneumonia jacket, tying at the sides, and over it a light flannel nightshirt with long sleeves, loosely fastened at the back, will cause the least disturbance. Warm antiphlogistine poultices to allay pain, or cold compresses to encourage aeration of the lungs and avoid pulmonary collapse, may be applied to the back and kept in position by a loose many-tailed bandage. Proper hygiene of the nasal passages is also necessary. They should be kept free by alkaline irrigation and some antiseptic nasal oil. Glycerine and borax keeps the tongue clean and moist. The child should be encouraged to drink plenty of water or sweetened fruit juices. Food should be light, nourishing, and given at two-hourly

intervals. Feeds known to have suited the infant before the illness should be continued. Breast feeding should not be interrupted, and if suckling appears to exhaust the child too much, some of the milk will have to be drawn off and given with a spoon. In older children a distended abdomen must be met by light diet for a few days: whey, peptonized milk, veal tea, jellies, fruit juices, and the like. Daily evacuation of the bowels must be attended to. Flatulence may be severe in infants and is best treated by a simple rectal washout or turpentine enema.

Drugs should not be given to reduce the temperature. Should it rise about 105°F., tepid sponging is the correct treatment. Tepid sponging may also soothe a restless child to sleep. A dose of brandy often has an equal effect, but in bad cases during the early stages, opium in the form of Dover's powder may be required. Wheezy breathing, or an associated 'croup', is greatly relieved by a steam tent, as described above. Continuous oxygen and carbon dioxide (5 per cent) tends to diminish a spasmodic cough, but its greatest use is in the presence of cyanosis. To be effective it must be given by the nasal catheter, the gas being bubbled through warm water, contained in a Woulfe's bottle, at the rate of 20 to 30 bubbles a minute. A little 2 per cent cocaine ointment on the catheter may be required in older children. Oxygen through a funnel is ineffective and merely a placebo for the relatives. The early stages of cardiac failure can be treated with small doses of digitalis—2 to 3 minims of the tincture six-hourly for a child of two years, but some authorities have no faith in this. If the child shows signs of collapse, stimulants will be required, such as brandy by the mouth and injections of camphor and ether (Curschmann's solution, minims 5 to 10); these can be alternated every four hours. Strychnine, adrenaline or coramine are other useful stimulants. Alkaline expectorants should be given when the bronchial secretions are sticky, and belladonna may give great relief should they become excessive.

Specific serum therapy has not been attended with sufficient success in children with broncho-pneumonia to warrant its routine use. Incomplete expansion of part of the lung from unresolved pneumonia is best treated by oxygen and carbon dioxide (7 per cent) inhalations from a gas bag. Strict attention must be paid to proper convalescence, and if there is any residual inflammation the child should be sent to the seaside.

Reviews

DISEASES OF CHILDREN. Third Edition. With contributions by thirty-six authors. Edited by H. Thursfield, D.M. (Oxon.), M.A., F.R.C.P., and D. Paterson, M.D. (Edn.), F.R.C.P. 1934. Edward Arnold and Company, London. Pp. xi plus 1152, with 277 figures in the text. Price, 50s.

THIS book has already established itself as the standard book on paediatrics for students in the British medical schools. The book has now reached its third edition, and it is still edited by one of the original editors, Hugh Thursfield. Furthermore, Sir Archibald Garrod still remains as a contributor. Other contributors have dropped out and new ones have been added. There are entirely new chapters on heredity, blood transfusion, orthodontic treatment, the newly-born infant, diseases of the accessory nasal sinuses and the ear, the lipoidoses, acetonæmia, cystoscopy and pyelography, rheumatism, allergy and tuberculosis.

The book has retained its original arrangement, but every chapter has been completely recast and much

new matter, including a number of illustrations, has been added, since the last edition five years ago.

Each one of the thirty-six contributors is a specialist attached to one or more of the leading London general or children's hospitals. This fact alone leaves the reviewer little chance for criticizing the individual chapters. In each a very complete account of the subject is given; our most important reaction was surprise that it was possible to achieve such completeness and yet limit the work to a single volume. The new chapter on heredity is a very welcome addition; it forms an excellent opening for a book on paediatrics.

We must admit to being a little disappointed in the section on the classification of anæmias. It struck us as being very confusing. We do not understand what the writer means by the statement that ' hæmolytic anæmias include not only those diseases in which there is an active destruction of the erythrocytes, but also those in which the hæmopoietic centres are so damaged that they can no longer produce the essential constituents of the circulating

blood in sufficient quantity'. Why should aplastic anemias be classified as haemolytic?

Tropical diseases are wisely avoided; wisely, unless the editors were prepared to obtain the collaboration of a writer with actual experience in tropical diseases. Malaria is the only tropical disease that we noticed in the book. We see that the writer has emphasized the fact that children require relatively large doses of quinine; they also stand them well. Plasmochin is advocated for 'prophylactic' use. We do not know exactly what the writer means by 'prophylactic', but we rather suspect that he means something that plasmochin does not do. It is a 'prophylactic' only in the sense that given to a patient it helps to protect the rest of the household from infection. Atcham is mentioned as a new synthetic compound, and the implication is that it has the same action as plasmochin.

The section on skin diseases deserves special mention; this chapter is illustrated freely. None of the illustrations (in this section) are in colour, but they seem to lose nothing by this as the photographs have been carefully selected and are very well reproduced.

This is not only an excellent textbook for students but the best reference book on *pediatrics* for the use of the practitioner that we know. This edition has surpassed the very high standard set by its predecessors.

L. E. N.

INTERNAL MEDICINE: ITS THEORY AND PRACTICE IN CONTRIBUTIONS BY AMERICAN AUTHORS.—Edited by John H. Musser, B.S., M.D., F.A.C.P. Second Edition. 1935. Henry Kimpton, London. Pp. xix plus 1288. Illustrated. Price, 45s.

This is a textbook of medicine arranged on traditional lines. The title is peculiarly American, and as the writers are all teachers in universities in the United States the American point of view is given preference, but not to the entire exclusion of all others, so that the reader with national prejudices need not be suspicious. There are twenty-six contributors and each is a master of the subject on which he writes. The days of the giants having passed with Osler, this form of textbook is the only one that will be tolerated in the future, but its success will depend as much on its editor as did that of the textbook of the past on its author; the editor in this instance appears to us to have been particularly successful in welding the contributions into an homogeneous whole, and in circumventing both repetitions and contradictions.

It is hard to discuss the individual contributions in a book of this kind. One's criticisms tend to be mostly with reference to omissions, and, in a book of twelve hundred and fifty pages that covers the whole subject of medicine, omissions must be condoned. One paragraph that struck the reviewer as disappointing was that on the specific treatment of lung tuberculosis; B. C. G. vaccine was the only 'specific' mentioned, but surely this vaccine has sprung into fame far more as a preventive measure than as a form of treatment?

The subject of tropical diseases is treated far more efficiently than is usual in a book on general medicine. Malaria and dysentery are given as much space as many of the important diseases of temperate climates, and in these sections all the recent advances are incorporated. (For chronic amebiasis viiform is recommended but carbarsone is referred to and is reported as giving good results.) It is all the more surprising therefore that for the treatment of kala-azar sodium antimony tartrate is given as the standard treatment and the dosage with this drug is described in detail, whereas neostibosan (wrongly called stibosan) and urea stibamine are only referred to as being said to give better results. Similarly, for the

treatment of oriental sore the antimony compounds are advocated and berberine sulphate is just mentioned.

The book is written in good English with only a few of the American spellings and constructions that are liable to distress those who have any feelings on the subject of the purity of our language. It is a book that we can recommend to the student and as a book of reference to the practitioner.

L. E. N.

AMEBIASIS AND AMEBIC DYSENTERY.—By C. F. Craig, M.D., M.A. (Hon. Yato), F.A.C.P., F.A.C.S., Colonel, United States Army, retired, D.S.M. 1934. Baillière, Tindall and Cox, London. Pp. viii plus 315. Illustrated 54 figures. Price, 22s. 6d.

This book is obviously written mainly for American circulation for even the title is spelt according to American ideas (there appear to be no rules governing the American mutilation of English). The words 'Amebiasis' and 'Amebic' appear to have no justification whatever for the author accepts the spelling of the causative organism as ending in 'ameba'. Such inconsistency shows up this type of Americanism in its true light, it is straining to produce a characteristic American atmosphere in a language Americans have accepted as their own and it has neither the recommendation of increasing simplicity nor of consistency.

The specific name *Entamoeba histolytica* is used throughout, thus classifying the parasite generically with *Entamoeba blattæ* Leidy, 1879. This is also an American fad, not accepted anywhere else in the world, and like the spelling habits calculated to confuse rather than clarify the subject. An explanatory note of this difference of opinion should have been given for the benefit of readers not versed in the niceties of zoological nomenclature.

The book as a whole is well written and gives a good account of *Entamoeba histolytica* infection in all its aspects, but there is a preponderance of references to American work as opposed to that of authorities in other parts of the world. This is especially noticeable in the section on geographical distribution, for the records of the United States occupy three pages and a table, whereas the rest of the world is dismissed in one page and a table, and some countries from which records are available are not even named.

For many years the author of this book has devoted much time and energy to the subject of the importance of amebic infection without any previous or present history of dysentery, and his chapter six dealing with this aspect of the matter is particularly valuable and should be carefully read especially by practitioners in temperate climates rather than in the tropics, for the latter are usually well aware of the importance of this form of amebic infection, whereas the former rarely suspect its presence.

The chapters on pathology are also especially good and many of the illustrations in this section are very fine, unfortunately the same cannot be said of some of the high power photographs of amebæ, for example, figures 7 and 45 which claim to show nuclear structure would need a vivid imagination to enable one to see what they are said to portray.

Treatment is fully discussed and is quite up to date, all the more recent methods being given, but here we note the only records quoted for the use of carbarsone are those of Anderson and Reed whereas reports of the successful use of this drug in a considerable number of cases in Calcutta have been published in this journal.

A few errors in printing are noted but most of them are obvious and lead to no doubt as to the meaning implied, except in the case of figure 33 where it is not quite clear what is meant by the '.....later chest wall'.

On the whole it is a useful production and is a valuable summary of the principal work on amebic

dysentery. On account of the preponderance of references to American work, already referred to, this book will be principally read in America, but it will be of great use to practitioners and research workers in other countries as well, and we feel that a much wider circulation would be assured if a fairer balance were struck between the work in the United States and the rest of the world.

P. A. M.

ABSCESS OF THE BRAIN: ITS PATHOLOGY, DIAGNOSIS AND TREATMENT.—By E. M. Atkinson, M.B., B.S. (Lond.), F.R.C.S. (Eng.). 1934. Medical Publications Limited, London. Pp. x plus 289, with 45 illustrations. Price, 21s.

This book is the Jackson Prize essay of 1926 rewritten, enlarged and brought up to date. It is divided into five sections.

Section I deals in detail with the pathology of brain abscess and is full and very lucid.

Section II, the longest of the book and the most important, describes the diagnosis. The customary method of dividing the progress of the condition into four stages, the invasive, the latent, the compressive and the terminal, is followed.

Section III deals in detail with treatment under ten headings.

Section IV gives a detailed description of twenty-eight personal cases.

Section V is composed of four sections, statistical tables, bibliography, index of proper names and a general index.

The book is primarily written for the aural surgeon but there is much in it which will repay study by general neurological surgeons. The author stresses the early general signs because those given in textbooks as the general signs of a brain abscess, headache, vomiting and slow pulse, are really ones which appear much later in the disease when compression is beginning.

He again stresses the importance of diagnostic puncture of the brain which opinion is at variance with the usual teaching. He compares diagnostic puncture of the brain by the otologist to exploratory laparotomy by the general surgeon.

The section on localizing signs of intracranial suppuration is especially good. The author does not favour any method of dealing with the abscess other than washing out the cavity gently with saline, using two tubes which are left in and shortened from time to time.

The whole book is well written and the illustrations are clear and informative, and it will for many years be the standard work of the subject in the English language.

F. J. A.

VITAL CARDIOLOGY: A NEW OUTLOOK ON THE PREVENTION OF HEART FAILURE.—By Bruce Williamson, M.D. (Edin.), M.R.C.P. (Lond.). 1934. E. and S. Livingstone, Edinburgh. Pp. viii plus 344. Available from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 11-4

This book presents the problems of cardiology in a new and most instructive light. The views put forward are the outcome of minute clinical observation and clear reasoning. The author is advocating the earlier treatment of cardiac dysfunction by conservative methods and emphasizes the importance of economy in regard to the reserve power of the heart.

New views are expressed with regard to the treatment by prolonged rest of rheumatic lesions and it is suggested that prolonged immobilization is a potent factor in the production of mitral stenosis. Though this is a little difficult to accept, we must readily agree to the point frequently disregarded, that the young heart requires exercise for its development, not by insisting on unnecessary immobilization

we may prevent the heart from developing a reserve power which will be so necessary later in life to a heart handicapped by valvular lesions.

The author is to be congratulated on the manner in which he has presented the subject and on the way in which the reader's attention is attracted from the first to the last page. We are fully convinced that any student or practitioner who reads this book will have not only his understanding but his interest in the problems of cardiology very materially increased.

E. H. V. H.

THE MEDICAL AND ORTHOPÆDIC MANAGEMENT OF CHRONIC ARTHRITIS.—By Ralph Pemberton, M.S., M.D., F.A.C.P., and Robert B. Osgood, A.B., M.D., F.A.C.S. 1934. Henry Kimpton, London. Pp. vii plus 403. Illustrated. Price, 21s.

This book is the outcome of the collaboration of a physician and an orthopædic surgeon.

The literature on the subject of arthritis under various names is overwhelming and, to anyone interested in the subject, the study has been time consuming. This volume presents the subject in a comprehensive manner.

The authors lay great stress upon the generalized nature of the disease of which the joint condition is but one manifestation. It is for this reason that they write so strongly concerning the extravagant claims for various drugs and procedures which are offered to the profession.

The writers state that their chapter on the treatment with vaccines 'will achieve little popularity'. They feel that vaccine therapy 'has received over-emphasis'. All medical men who have treated these cases with vaccines will agree with this.

There is no doubt that a definite advance has taken place in the treatment of chronic arthritis, but it is only by applying the various methods of treatment given in this volume that such results are brought about.

In the preface a note of hope is struck when the authors state that chronic arthritis is largely a preventable and curable disease. Orthopædic co-operation should not be necessary but as treatment is at present, such co-operation is inevitable. Physicians who have to treat cases of chronic arthritis should study this book. A more widespread knowledge of the underlying principles would do much to dispel the pessimism in the profession and even more amongst the general public.

The book is well written and is printed in bold type. The illustrations especially on appliances and surgery are clear and informative. The bibliography is extensive there being one at the end of most chapters together with a separate index of authors at the end of the book.

F. J.-A.

SUMMARY OF THE TREATMENT OF FRACTURES AND DISLOCATIONS.—By R. Broomhead, M.B. (Leeds), F.R.C.S. Jowett and Sowry Ltd., Atblon Street, Leeds, 1. Pp. 39. Price 3s. 6d. Including postage. Also obtainable from Henry Walker (Bookseller), Limited, Briggate, Leeds, Yorks.

The present brochure has been carefully compiled in a tabulated form, containing a summary of the causes and treatment of common fractures and dislocations, in accordance with the usage and practice of the orthopædic department of the General Infirmary at Leeds. It is mainly intended for the benefit of the medical students of the Infirmary as a refresher and guide to treatment. Charts and tables are apt to defeat their own purpose, because they tend to encourage cramming. Used intelligently along with clinical work this booklet would be found useful in many ways. Others, however, will gain some idea about the excellent routine work that is being done in a large hospital like the General Infirmary at Leeds.

P. N. R

THE ANATOMY OF SURGICAL APPROACHES.—By L. C. Kellog, A.B., M.D. 1934. Pp. x plus 134. Figures 29. Price, 7s.

This is a short book of 134 pages. It is neither a book of operative surgery for the student as it is incomplete nor is it an operative guide to the surgeon, except for one or two operative procedures, such as the exposure of long bones. The book can be recommended to students appearing for their 'final', as a means of rapid revision of operative surgery. Some of the line drawings could be dispensed with as they are far from clear.

F. J. A.

INJURIES AND THEIR TREATMENT.—By W. Eldon Tucker, M.A., B.Ch. (Cantab.), F.R.C.S. (Eng.). 1935. H. K. Lewis and Co., Ltd., London. Pp. xi plus 173, with 80 illustrations. Price, 9s.

THE title of Mr. Tucker's book may give rise to some misconception regarding its subject-matter, but this will be rapidly dispelled on closer acquaintance. The scope of this book embraces the pathology and treatment of soft-structure injuries, which, as we are all aware, might give rise to a great deal of pain and disability. The author has given cogent reasons as to why absolute rest is wrong in the treatment of most injuries to joints and muscles, and why every endeavour must be made to disperse the excess of traumatic effusion. Among the numerous rational advances in the treatment of these conditions, physio-therapy and manipulative surgery naturally occupy a premier position. One of the most effective methods consists of the non-padded plaster cast of Böhler, aided by active movements. Alternatively, the anodal galvanic current of Heald and the graduated muscular contractions of Sir Morton Smart are recommended by the author with a convincing record of cases. Excessive effusion is better aspirated with all aseptic precautions.

Against the author's advocacy for the use of faradic contractions early in the treatment of injuries, the criticism might be offered that the muscles continue to waste in spite of such treatment. But there is no doubt that recovery is far quicker than if no faradic contractions had been given. The claims of different methods of physio-therapy have been adjudicated with impartiality and their indications clearly set forth. But, we confess, we would have liked to know something more definite about short-wave diathermy therapy and its results. Nevertheless, we have much pleasure in welcoming this admirable little volume. In some places, perhaps, it suffers from too much brevity and condensation; a little more amplification would have been appreciated. The illustrations are excellent and the various grips and manipulations have been clearly explained.

P. N. R.

ESSENTIALS OF PEDIATRICS FOR NURSES.—By Philip C. Jeans, A.B., M.D., and Winifred Rand, A.B., R.N. J. B. Lippincott Co., Philadelphia and London. Pp. xii plus 503, with 73 illustrations. Price 12s. 6d. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 9-6

THIS book is subdivided into four parts, the first deals with normal development and care in infancy and childhood; the second part deals with nursing of the sick child and its technique; infant nutrition and nutritional disorders are considered in the third part; and the last one deals with malformations and diseases. On the whole, the general plan of the book is based on sound principles, but an equal degree of precision and accuracy with regard to practical details has not been maintained throughout. For feeding with lactic acid milk, the ordinary pin-hole rubber nipple will not do; its orifice will have to be enlarged; this is easily done with a red-hot needle. In cases of severe

diarrhoea, skimmed lactic acid milk is preferable. The carbohydrate mixture is replaced with 5 per cent dextrin. The omission of rice water, which has secured a recognized place in infant dietary, is also regrettable.

The management of congenital herniae in infants is inadequate. A skein-of-wool truss will generally control an inguinal hernia, but it must be constantly worn. For babies a washable pneumatic truss is very serviceable. We are afraid that a strip of adhesive plaster is not suitable for the control of umbilical hernia in infants in this country, especially during the summer months. The old-fashioned 'coin and binder' has much to recommend it. It has the additional advantage that no injury is caused to the delicate skin. For the treatment of impetigo contagiosa, a 3 per cent ointment of ammoniated mercury has been prescribed, but this is very likely to give rise to a troublesome form of dermatitis. It has been our practice to use a 1 per cent ointment with gratifying results. The treatment of burns is equally unsatisfactory. There is no mention of the tannic acid method of treatment!

All these are rather serious foibles, which are bound to detract from the utility of the book. It would, therefore, require a careful revision for the next edition to make it more practical and up to date. The printing, get-up and illustrations are beyond reproach. A glossary and an index have also been appended.

P. N. R.

THE INFLUENCE OF HEREDITY ON DISEASE.—By L. S. Penrose, M.A., M.D. 1934. H. K. Lewis and Company, Limited, London. Pp. vii plus 78. Illustrated. Price, 5s.

THE author has amplified his Buckston Brown Prize essay and published it in the form of a book. It was not the author's purpose to write a treatise on the subject and therefore he has had to exercise selection in the heredity problems that he discusses.

The importance of genetics in medicine is likely to increase rather than to decline in the near future, though the time has not yet come, and probably never will come, when the application of genetic principles can replace entirely the methods of controlling disease that are applied to-day, our knowledge of genetics has reached a stage where certain general principles can be laid down for the guidance of the physician and as a foundation for genetic research in the future.

In this essay Dr. Penrose explains in language that the physician, without a special knowledge of mathematics, can understand on what these principles are based and concludes with a very concise but valuable summary.

It is a book that we can recommend to those who are interested in the subject of genetics, and also to those who are not yet but feel that they ought to be; the latter will find it a very suitable introduction to the subject.

MEDICAL RESEARCH COUNCIL. The Inheritance of Resistance to Bacterial Infection in Animal Species: A Review of the Published Experimental Data.—By A. Bradford Hill. (Special Report Series, No. 196.) 1934. Published by His Majesty's Stationery Office, London. Pp. 71. Price, 1s. 3d.

THE measurement of the relative importance of environmental and inherited factors in the production of differences in immunity to bacterial infection is by no means an easy task. Especially difficult is it to assess the influence on the average resistance of a herd, or a community, of the selection of genetically more resistant animals as compared with immunization by non-fatal infection. From the genetic standpoint the comparison of persons exposed, apparently, to similar risks of infection is complicated by possible undetermined differences in environmental factors,

such as personal habits and personal hygiene. Equally important is the frequent lack of knowledge as to whether or not the individual has had previous contact with the infection in question. It is obvious that often the same uncontrolled or unknown factors may disturb racial comparisons amongst human beings and throw doubt upon reported genetic differences. It is difficult to determine whether an inherited rather than an acquired immunity is involved, or the extent to which both are playing a part. On the other hand, it is quite clear that constant and true-breeding differences in resistance to particular diseases distinguish various species'.

The published experimental evidence on this subject is reviewed and summarized in this monograph.

MEDICAL RESEARCH COUNCIL. Medical Uses of Radium: Summary of Reports from Research Centres for 1933. (Special Report Series, No. 197.) 1934. Published by His Majesty's Stationery Office, London. Pp. 40. Price, 9d.

This report summarizes the results of research work in the treatment of cancer—and also of some non-malignant conditions—which has been done during 1933 by means of radium lent by the Medical Research Council to selected centres throughout the country. It continues the accounts given in the eleven similar reports which have preceded it.

In addition to describing work done during the past year the report gives statistical data relating to the after-histories of patients treated in earlier years. It contains, further, a section dealing with some purely experimental inquiries into the action of radium'.

THE STATUS OF ENZYMES AND HORMONES IN THERAPY.—By G. F. Walker, M.D., M.R.C.P. (Lond.). 1935. John Wright and Sons Limited, Bristol. Pp. 48. Price, 2s.

The author's opening words are 'I suppose no one will deny that a great deal of confusion—to use no harsher word—exists in therapy with endocrine and similar products'. The harsher words that the author refrained from using were presumably 'quackery and commercial exploitation'. If this is what he meant we quite agree with him, and we think that his little book should prove a very valuable corrective.

He who sets out to use glandular preparations, says the author, should ask himself the following questions:—

1. Do I clearly recognize in my patient a hormonal lack?
2. Do I hold in my hand the truly appropriate remedy for that lack?
3. Is the preparation stable, active, pure, and uniform?
4. Can I accurately determine the dosage?
5. Is the preparation smoothly active when administered by the route I propose?
6. Are ill-effects impossible?

Even if these questions cannot be answered in the affirmative, he gives the prescriber one more chance, provided the preparation he proposes to use is harmless; he must ask himself 'Is the therapy really justified as a simple clinical experiment or under the authority of empiricism?' If he cannot give himself an unequivocal answer to this question, then he must not proceed with the treatment on the lines he was proposing.

We are afraid that the last question will let out too many practitioners with elastic consciences, as few realize the responsibilities that a simple clinical experiment entails for the experimenter.

The author has then taken each glandular preparation in the *British Pharmacopæia* and the *British Pharmacopæia Codex* and discussed very concisely what can and what cannot be expected from their use.

A book can be read in about an hour. It is a good thing for the medical profession of

this country—or of any other—if every member were compelled to read it from cover to cover. And though it can be read in an hour it is a book that is well worth adding to the small row of reference books that the practitioner keeps on his table.

MEDICAL RESEARCH COUNCIL. Tests for Respiratory Efficiency.—By Alan Moncrieff. (Special Report Series, No. 198.) 1934. Published by His Majesty's Stationery Office, London. Pp. 62. Price, 1s.

'MODERN diagnosis and treatment make an increasing demand for methods by which the functional efficiency of organs or systems of the body may be objectively and quantitatively determined. It is important alike for the physician and for the surgeon to be able to assess the degree of impairment with which he has to deal. It may also be necessary to have means of measuring a disability for such purposes as those of compensation claims. Apart from ill-health, moreover, there may be occasion for efficiency tests in the selection of individuals for occupations which make more than the ordinary demands upon a given function.

In the case of the respiratory system, the search for a satisfactory method of estimating efficiency has already a long history, and has followed various directions: it has nevertheless not yet been wholly successful. The object of the work which Dr. Alan Moncrieff undertook, with the aid of a grant from the Medical Research Council, was accordingly to investigate the value of the different methods that are available, and the possibilities of improving them. The conclusion reached is that no one test can be relied upon, and that a patient's "vital capacity", ventilating efficiency and expiratory force must all be reviewed to gain a useful estimate of respiratory function. Dr. Moncrieff has described a technique which not only gives the necessary information on these points, but which can be rapidly carried through with a minimum of discomfort to the patient. This method will no doubt be useful in the clinical evaluation of respiratory efficiency in both medical and surgical cases. The report should also be of great assistance as a detailed presentation of the known facts of this important problem, and should stimulate further investigation'.

THE INTERACTION OF THE LYMPH AND BLOOD GLANDS.—By D. Montgomery Paton, L.R.C.P. et S. Edin., etc. 1935. Baillière, Tindall and Cox, London. Pp. xi plus 173, with 80 illustrations. Price, 9s.

In the Year of Grace 1889, Dr. D. Montgomery Paton, armed with an L.R.C.P. et S. Edin., etc., went forth into the world to practise medicine. In the first nine years he practised his profession on orthodox lines—this much we are told—and we hope that his patients played the game and reacted in the orthodox manner to his treatment. Then it began to dawn on Dr. Paton that there was more in medicine than the textbooks had told him. He found that patients sometimes got better, even if you treated them for the wrong disease, and even if you gave them a form of treatment that should not, according to the textbooks, cure any disease at all. He found himself at the parting of the ways; was he to disbelieve the textbooks or was he to disbelieve his own eyes? He chose the way that Harvey would have chosen, he snapped his fingers in the face of orthodoxy, and for thirty years or more he followed the dictates of his own experience!

If the cases that the author quotes in his book are fair samples of his patients he must have been a very successful, or a very lucky (which comes to much the same thing), practitioner. His essays at experimental medicine were less fortunate. Animals would die when they should have lived, or would live when they should have died. Rationalization came to his rescue and a codicil was added to his theory, so that it all

came right in the end. However, he said, why bother about experiments on animals when the human race is before one, clamouring to be experimented upon, and so he turned away impatiently from these stupid little animals, and returned once more to the practice of medicine on *Homo sapiens*.

Dr. Paton has now retired and has had time to ruminate on his past. He has evolved a theory to fit his experience, and has, we believe, presented it

in this book; it isn't a very convincing theory, nor has he expressed it very clearly, but there it is for anyone who wants to hear about it.

Dr. Paton's major 'discoveries' include the oral administration of anti-diphtheritic serum for streptococcal and staphylococcal infections of all kinds, and emetine for alcoholism, neurasthenia and other disorders of the nervous system.

We cannot recommend this book to anybody.

Abstracts from Reports

ANNUAL REPORT ON THE WORKING OF THE RANCHI INDIAN MENTAL HOSPITAL, KANKE, IN BIHAR AND ORISSA, FOR THE YEAR 1933. BY J. E. DHUNJIBHOY, MAJOR, I.M.S., SUPERINTENDENT

THE accommodation of the hospital remained the same as in the previous years, viz, 1,014 for males and 272 for females, total 1,286. The 50 extra emergency beds sanctioned by Government in 1929 to relieve congestion in the male section were in demand throughout the year. The daily average strength of the male patients during the year was 1047.12. Many improvement and expansion projects could not be taken up owing to financial reasons. There was no overcrowding in the female section.

A considerable number of the new admissions were not really new in the true sense of that expression, but were cases of long-standing mental disorder who, in default of proper mental hospital accommodation and for other reasons, had been detained for shorter or longer periods in jails or at home. Taking into consideration the above state of affairs, the figure 27.78, showing the ratio per cent of cases cured to the so-called total new admissions in the year 1933, can be rightly looked upon as extremely satisfactory and serves as a direct incitement to the staff who devote every possible care to the employment of the modern methods of treatment to the newly-admitted patients in the reception wards of this modern mental hospital.

As in the previous years, malaria has been responsible for a large number of cases of sickness during the year under review. All practicable measures were adopted to prevent the breeding of mosquitoes inside as well as outside the hospital area by the sanitary squads of the hospital under the direct supervision of the second assistant superintendent and myself. In spite of all stringent sanitary measures to prevent the breeding of mosquitoes, no satisfactory results were achieved on account of the vastness of the breeding grounds (paddy-fields) in the immediate vicinity of the hospital which always remained a source of danger. Moreover, a small area within the male enclosure also proved a great menace to the health of the patients of the blocks situated in close proximity to this insanitary area. On account of the deficient drainage in this area, the water stagnates and it helps the breeding of mosquitoes. The managing committee have recommended to Government to rectify this and have passed a scheme costing Rs. 1,180 to provide adequate drainage in this area. Statistics show that nearly 50 per cent of the positive malaria cases of the year under review were contributed by this insanitary area in the male enclosure.

Paying patients.—During the year 91 patients (62 males and 29 females) were treated as compared with 83 (17 males and 26 females) in 1932 and 86 (61 males and 25 females) in 1931. The popularity of the hospital with this class of patient is fast growing and every year we are obliged to refuse admission to several paying patients for want of accommodation. The scheme of building separate wards for paying

patients could not be considered owing to continued financial stringency.

As sulphur therapy proved very satisfactory in previous years this treatment was continued during the year under report.

I have been experimenting with sulphur injection since 1930 and up to the end of 1933 I have treated 215 cases suffering from various mental disorders with very satisfactory results. Out of 211 cases 81 remained stationary, 85 improved in their mental health and 35 completely recovered. It is very gratifying to record that since our publication of the good results of our pioneer work with sulphur injections in India many private practitioners have adopted this treatment with encouraging results. One of the practitioners, Dr. K. K. Sen, published an article on the success achieved by sulphur injections in one of his cases which appeared in the *Indian Medical Gazette* of September 1933.

Occupational therapy.—Reference has frequently been made in our annual reports to the value of occupation and particularly all outdoor occupations in the treatment of the insane. While employment out of doors is recognized as being of the greatest value, there are many patients who cannot or will not take part in work of the hospital garden or even in domestic occupations and for them provision has been made by the establishment of occupational classes where instructions in various arts and crafts are given by experienced instructors. The variety of occupations provided is such that there are few patients for whom some congenial form of occupation cannot be found, and the good results both in the contented mind and the consequent improved bodily condition of the patients as well as the high quality of the articles produced give a return entirely out of proportion to the small initial and recurring cost. It is a mistake to suppose that occupational therapy is impossible without the employment of a few costly and highly trained occupational therapists. During the year under review a great effort was made to engage patients who were normally regarded as turbulent or unemployable with a view to making them happier and more tractable. This experiment has shown that practically every ambulant patient can be employed and is infinitely better and more easily controlled when he is employed. The medical officers in charge of such turbulent patients report that these patients are now sleeping well at night which they never did before without hypnotics, have good appetites, eat well and look much fitter and better than before and have put on weight. A very brief outline of work done is as follows:—

Weaving, cane and bamboo work, smithy, carpentry, tailoring, cobbling, mending cloths, mattress and pillow making, lace making, knitting, embroidery work, durrie making, gardening, joss stick making and miscellaneous and domestic work.

Garden work.—The vegetable garden of this hospital is one of the best of its kind in the provinces of Bengal and Bihar and Orissa. It is run entirely with patients' labour and the average number of patients

employed in the garden throughout the period under report was 200.

A variety of good vegetables, fruits, fodder, etc., were grown in the hospital garden and the produce was more than ample to meet the annual requirements of the institution.

Reward to good workers.—Besides the daily extra gifts of cigarettes, tobacco and other comforts of life, a sum of Rs. 600 is annually divided amongst hard-working patients. They look forward to this reward and spend it as they like and some of them even send this money to their families.

Sports and amusements.—These continued, as usual, throughout the year, and have proved to be of excellent therapeutic value.

About 200 patients attend the amusement hall of both sections every evening and they enjoy various indoor games and music. The cinema which was purchased and installed during the year under report has maintained its popularity with the patients and forty-seven performances were witnessed by crowded houses with happy faces. Besides the daily usual amusements and weekly cinema shows, thirteen special entertainments were also given.

Fourteen football and 10 hockey matches were played with outside teams. The annual sports, a great event to which patients look forward, was held as usual and several prizes were distributed to the winners of different events.

The hospital band played at all the entertainments and continued to be a source of great enjoyment to the patients. The band party consists of 12 attendants of the hospital and is conducted by Naik Shibcharan through whose efforts it has maintained its efficiency and progress.

Picnics.—These are a notable feature of amusement for the patients and are greatly appreciated by them.

Dietary.—The dietary of this hospital is good and varied and the cost is remarkably low. The feeding of all patients is strictly supervised by the medical officers. Weights of all patients are recorded every month and the charts maintained indicate a general rise of weight. Patients found to lose weight steadily are at once segregated in the infirmary for adequate treatment. Extra nourishing diets are given to weak and anæmic patients.

There is much more matter of interest in this report but what we have given shows that the patients are well cared for.

REPORT OF THE DIRECTOR OF THE SCHOOL OF TROPICAL MEDICINE OF THE UNIVERSITY OF PUERTO RICO FOR THE YEAR ENDING JUNE 1934

Department of Bacteriology

THE activities of the department of bacteriology have, for the most part, been devoted to the study of tuberculosis, and recurrent lymphangitis.

One of the important findings of this department this year has been the development of a skin test for *Brucella* infection. This achievement may be of immense practical significance and of considerable economic value. Besides the development of this diagnostic method, attempts have been made to fractionate the organism into its different chemical constituents. Considerable advance has been made during the year in the study of the streptococcus problem in Puerto Rico. So far, thirty strains of hemolytic streptococci have been isolated and carefully studied and compared with the streptococcal strains from the United States. To date, no difference has been established between the northern and southern strains. The immunological response of lymphangitis cases to hemolytic streptococci and their products is being studied; also the allergic reactions in these same cases have been carried out by testing intradermally with filtrates of Beta-hemolytic streptococci.

Department of Clinical Medicine

The various phases of the clinical aspects of schistosomiasis have been studied. Through the joint efforts of the hospital staff and the department of bacteriology, extensive work has been in progress on filariasis and lymphangitis, sprue, pernicious anæmia and uncinariasis, diseases of the skin and their ætiological agents.

Department of Parasitology

The members of this department, either alone or jointly with other departments of the school and hospital, have engaged in several quests of scientific interests and of practical importance. Together with Dr. E. C. Faust of the Medical School of Tulane University, they have made interesting progress on the historical, epidemiological, biological, pathological, clinical and preventive aspects of schistosomiasis *mansoni* in Puerto Rico. This study of schistosomiasis has been divided into seven main divisions, each aspect of the problem being handled by the personnel of the different departments. It seems only appropriate to mention that the data, thus obtained, have been highly significant, and will furnish an important clue for the pathological and clinical studies now being undertaken, and for the questions of prevention and of control.

The increased appreciation of the importance of the development in this laboratory of more specific methods of detecting ova of *Schistosoma mansoni* has led many physicians and individuals from various districts of the island to apply for diagnosis. Weight has been attached to the skin test as a more reliable method for diagnosis in preliminary trials, since in the initial stage of the disease, in long-standing chronic cases, and in others where only one sex of the worm is present, ova are non-existent, or practically non-existent, in the stool. The treatment of schistosomiasis with Fouadin has continued with considerable promise.

In addition to the above investigations, time has been given to the work of the pathogenic protozoa, *Entamoeba histolytica*, and to the liver-fluke, *Fasciola hepatica*.

During the year, human infestations by the liver-fluke have been found. Owners of infected animals have been advised regarding such parasitic invasion; in some cases treatment has been administered with beneficial results.

Studies of the blood in cases of anæmia, associated with hookworm disease and schistosomiasis, have been continued. Worm ova and helminth counts in connection with these diseases have followed as a regular routine experimental procedure. In conjunction with the department of clinical medicine, treatment for cestodes, by means of the duodenal tube, has been tried with partially favourable results. With the co-operation of the department of chemistry, determinations of iron content of the whole blood in cases of sprue, malaria and intestinal parasites have been initiated. The work on the specificity of helminthic antigen, in relation to experimental diagnosis, is completed and in press.

Department of Mycology

Three cases of chromoblastomycosis have been found on the island, which indicates that Puerto Rico can be considered as an important focus of this rare disease. A revision has been made on a previous study of pathogenic fungi, associated with epidermophytosis. Investigations that have been made on laboratory contaminants may lead to the disclosure of certain facts that may be of importance in the field of general mycology.

The work on monilia infection has continued. The immunological and serological reactions of the pathological fungi have been studied with the purpose of testing the agglutinating properties of certain strains, isolated from the stools of sprue patients.

Within the year four cases of granuloma inguinale have been found, of which the supposed causative agent and its fermentation reactions have been studied. The epidemiological aspects of this disease is receiving consideration.

REPORT ON THE ADMINISTRATION OF THE DELHI MUNICIPALITY FOR THE YEAR 1933-34. VOLUME II. ANNUAL REPORT OF THE MEDICAL OFFICER OF HEALTH FOR 1933

Population.—The mid-year population for 1933 is 353,747 plus 4,981 equal to 358,728. In my last year's report I put up a statement giving the areas and the populations of the first class cities of Upper India and pointed out that no other first class city of India is so dangerously and terribly congested as Delhi city. The number of people per acre in the city works out to 90 per acre or 57,739 per square mile. The city which stands next in congestion is Cawnpore with a population of 44 per acre or 28,343 per square mile. Lahore, the capital of the Punjab, has a population of 25 per acre or 15,387 per square mile and Lucknow the most important town of the United Provinces has a population of 24 per acre or 15,258 per square mile.

Delhi city is peculiarly situated on account of its being hemmed in on all sides by other municipalities (New Delhi, Civil Lines and Fort) and the river Jumna. The only avenue of extension therefore lies on a portion of its western border. Delhi city since the inauguration of Delhi as the capital of India has suddenly sprung into great importance and there has naturally been a large influx of people from all other places and this fact should be reckoned as a potent factor in the great increase of population and the consequent overcrowding. The task before the municipal committee regarding opening out of the congested areas, remodelling of the slums, etc., is stupendous but not insurmountable. Particular attention should be paid to prevent cropping up of new slums and fresh overcrowding.

Smallpox.—The year under review witnessed a very severe epidemic of smallpox. The total number of cases of smallpox recorded during the year under review was 3,681 with 808 deaths. A statement of smallpox cases and deaths during the last five years is given below:—

Year	Cases	Deaths
1929	162	66
1930	542	362
1931	44	17
1932	517	166
1933	3,681	808

Cholera.—Two cases of cholera were reported during the year under report. Both these cases were imported. One was imported from Hardwar and the other from Patiala.

Plague.—Plague was absent during the year under report except for one case which was imported from the district of Bijnor.

Fevers.—Four thousand and sixty-two deaths from fevers (excluding enteric fever and malarial fever) were recorded during the year under report as compared with 3,025 in the preceding year. Of these 1,902 occurred among males and 2,160 among females.

Malaria.—The year under report witnessed unprecedented heavy rains (60 inches against an annual average of 22 inches). Heavy rainfalls were also noticed in the hills and on the plains with the result that all the areas along the river Jumna were inundated. On the subsidence of the floods, innumerable pools were formed and as a sequence malaria broke out in epidemic form.

Respiratory diseases.—Two thousand three hundred and sixty-eight deaths were recorded from respiratory diseases, excluding phthisis, out of which 1,279 occurred among males and 1,089 among females, and 493 deaths

were reported from phthisis during the year under report.

Tuberculosis is still rampant in this city. Unfortunately the building by-laws are very defective. They do not ensure provision of adequate amounts of light and air in houses, particularly in the ground floor rooms. Moreover unhygienic houses are increasing in number. More than that some of the newly-created *basties* are nothing short of new shums. This city has innumerable narrow and tortuous alleys wherein ventilation is most defective. All these factors tend to keep the disease on the increase. On the one hand the city is being turned into a manufactory of tuberculosis, while on the other hand attempts are being made to put up clinics and sanatoriums to alleviate the sufferings of the unfortunate victims of this disease. The preliminary and most essential action required is to prevent creation of new 'plague-spots' in the city and to remove those that exist at present.

Cerebrospinal fever.—Scattered cases of cerebrospinal fever occurred in the different wards of the city. The first case came to notice in the month of January. In February there were 2 cases and in March 18 cases. Enquiries were made from different places, but no useful information on this subject was forthcoming. I consulted the Public Health Commissioner with the Government of India and was informed that this disease has been in existence in Lahore for over a year and that there have been several cases of cerebrospinal fever in the Borsal Institute.

Control of food, milk and water supply.—The regulations framed under the Punjab Pure Food Act of 1929 were brought into operation during the year under report. The pure food regulations lay down the standards of the various articles of food.

A small laboratory has been fitted up in the health department and milk and ghi samples are analysed. The analytical work was actually started from the month of August and 422 milk samples were examined. The work of ghi analysis was started later and 75 ghi samples were analysed. Nine persons were prosecuted for selling adulterated ghi.

In the operation of the Pure Food Act and the regulations made thereunder certain difficulties have been experienced. The procedure of taking samples will have to be revised so as to ensure proper operation of the Act. After the Pure Food Act has been worked for a period of a year or so, a report on the various defects or drawbacks noticed therein, with suggestions for their rectification, will be submitted. However the introduction of the Pure Food Act and the regulations prescribed thereunder have been a distinct step in assisting the health department in taking action against the vendors of articles of food which are injurious to health or inferior in quality.

SUMMARY OF THE REPORT ON THE SESSION OF THE OFFICE INTERNATIONAL D'HYGIENE PUBLIQUE HELD IN PARIS, 8TH OCTOBER TO 17TH OCTOBER, 1934. BY LIEUT.-COLONEL J. TAYLOR, D.S.O., M.D., D.P.H., I.M.S., DIRECTOR, CENTRAL RESEARCH INSTITUTE, KASAUJI AND DELEGATE FOR THE GOVERNMENT OF INDIA

Summary

In spite of the fact that many large problems which had occupied the attention of the office for some time had been disposed of at the May session there was still a large volume of work to be got through and the time of delegates was very fully occupied.

The following are points in which the Government of India may be specially interested.

(i) The question of uniform regulations for vaccination and anti-cholera inoculation in countries through which aircraft passes from

India The committee has taken up this subject very actively and will press for the unification of regulations and for conformity with the terms of the Convention for Aerial Navigation. It is recognized that this is a question affecting all countries and the International Commission for Aerial Navigation will support the case for unification as this matter affects air transport companies.

- (ii) Ratification of the International Sanitary Convention for Aerial Navigation. It is expected that the tenth ratification necessary to bring the convention into force will be made at an early date and participation by India will be strongly welcomed.
- (iii) Measures for the eradication of mosquitoes from aeroplanes have been shown to be necessary under certain circumstances and such measures are now in routine use. Information on effective measures is available and their application in India might be tested.
- (iv) Further reports from delegates are awaited on the subject of the use of standard treatments for syphilis under the Brussels Agreement. Attention is drawn to the work of the Expert Committee of the League of Nations on courses of treatment. The action in applying approved courses is to be considered.
- (v) Communications of great value on the cultivation of vaccine lymph on chick membrane have been received. The attention of

administrative officers is directed to the possibilities which this vaccine offers.

- (vi) The communications and discussions on terminal disinfection show the modern attitude in the matter. Doubt has been cast on the use of this procedure as a routine. Experimental evidence suggests that in many cases it is of little value. It may be applicable in some cases when specific methods are applied and disinfection during the progress of certain diseases is advisable.
- (vii) The representations from India on the subject of certain Soviet ships with pilgrims passing Kameian has resulted in the U. S. S. R. Government taking action against the masters of the ships.
- (viii) On the subject of the training of medical subordinates, in which both the office and the Health Committee of the League of Nations are interested, information may be required as to the experience and practice in India. This subject will come up at the second conference at the Cape to which it is presumed India will be asked to send a delegate.

The association of laboratory workers in England with our research work on cholera in India which has developed out of the work of the office would appear likely to be of great value, and India is looked to for advance on this subject.

A very valuable series of communications were presented during the session which will be of interest to workers on the special subjects dealt with.

Correspondence

A PLEA FOR THE USE OF CONCENTRATED SALINE IN CHOLERA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Sir Leonard Rogers has proved beyond doubt the efficacy of hypertonic saline in the treatment of cholera. He further clearly showed that hypotonic and even normal saline has not only been found less useful but, in some cases, actually harmful.

The above facts naturally set one thinking, as to what proportion of utility is to be assigned to the two chief constituents—salt and water—of Roger's hypertonic saline.

Is the collapse in cholera due more to the loss of salts or to the fluids from the blood?

Sir Leonard Rogers has again shown that in cholera the salts are excreted proportionately much more than the fluids, resulting in the hypotonic condition of the blood, with sometimes as low as 0.6 per cent in bad cases. He further showed that, in cases where the percentage of salts in the blood could be brought up to 1 per cent or more, death rarely took place in the collapse stage.

Is it, therefore, probable that the collapse in cholera is due to the hypotonic condition of the blood, producing a vasomotor paralysis, with ultimate failure of circulation?

What happens in most cases of cholera may probably be summarized as follows—The diarrhoea and vomiting deplete the body of fluid and salts—proportionately more of the latter (the cause for this proportionately greater loss is perhaps a protective response on the part of the body to the stimulus of the cholera toxin, for, the salts and the cholera toxin form a crystallo-colloidal union, which is an essential factor in the excretion of the poison). It is, therefore, essential that this extra loss of salts from the circulation be made good, as early as possible to facilitate the excretion of the cholera toxin. This depletion

goes on until the circulation becomes incapable of supplying the splanchnic area. Then the motions and vomiting gradually get less and less and ultimately stop, so also does the urine. The splanchnic area thus becomes a closed pool as it were, with gradually increasing amounts of cholera toxin, with no hope of excretion. Thus, a vicious circle is established, a failing circulation with increasing toxins in the splanchnic pool and no excretion of toxins, this ultimately results in the complete failure of circulation and death.

Can salts alone (saline in a concentrated form—20 ccm of a 20 per cent solution) revive this failing circulation of cholera?

Perhaps they can. After reading an article by C. MERRIS (*Bull. Soc. Path. Exot.*, XXVI, 900) I had the opportunity of trying this simple method on two collapsed cases of cholera, both with cramps, suppression of urine and a failing pulse. Two more collapsing cases of cholera were similarly treated in this month at the Veduanyam festival (South India), with success; in three of the four cases, *Vibrio cholerae* was isolated. In all the four cases, the patients passed urine a few minutes after the injection of the concentrated saline with very quick relief of the other symptoms as well. All recovered without any further hypertonic saline. It is, therefore, quite possible that salt is the chief factor in reviving the circulation, and if this is supplied, even without any extra amount of fluid intravenously, the collapse of cholera will be overcome.

The passing of urine in these cases, a few minutes after an injection of only 20 ccm. of fluid, clearly shows that the revival of the circulation, even that of the kidney, is due to the salt and not to the fluid.

No definite conclusions can, however, be drawn from these few cases, but, this is certainly an incentive for further work. Even if this method, after a complete trial, were to be found less efficient than the hypertonic saline, it is bound to be the best first aid,

in the hands of the rural practitioner and the field worker whose helplessness (partly for want of equipment and partly due to inexperience of Roger's technique, simple as it is) in treating collapsed cases of cholera is so well known

Advantages

The advantages of this method are —

Simplicity—the sterile concentrated saline can be easily stocked in 20 ccm. ampoules and very easily used without any risk of sepsis.

There is no fear at all of oedema of the lungs resulting from excess of fluid.

The reaction is less likely to occur.

The copious evacuations with a recurrence of collapse that sometimes follow large injections (3 pints) of fluid are not likely to occur at all in this method.

With increasing viscosity of the blood, there is less and less likelihood of the fluid and the salts in it draining out of the circulation—(analogy of the usefulness of gum saline in surgical shock). Thus, if the salt content of the blood is kept above normal, and if the circulation is maintained thereby, without any further injection of fluid, there is less likelihood of the salt draining out of the circulation. On the other hand, when the lost fluid is replaced in the circulation, the salt is bound to be drained out at a much higher rate than if the fluid were not replaced. Thus, in the concentrated saline method, because the salt is better retained in the circulation, there is less likelihood of the necessity of more injections than one.

With revival of circulation, the kidney begins to work, but the strain on the organ is much less in this method, as there is not much fluid to be excreted. The necessity of relieving the strain on the kidney is essential in cholera where the skin is practically inactive. Thus, uræmia and similar complications may be lessened, if not avoided.

Yours, etc.,

Y. S. NARAYANA RAO, M.R., B.S., D.T.M.

KING INSTITUTE,
GUINDY,
15th February, 1935

A SIMPLE METHOD OF BUG DESTRUCTION

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have read with interest the article on 'A simple method of bug destruction' by J. N. Pacheco in the February issue of the *Indian Medical Gazette*.

The author writes 'Coconut oil is a poison to the bed-bug'.

Grains are infected with many kinds of virus and to prevent this infection people in Gujarat use castor oil. Castor oil is heated and then rubbed in small quantities. This preserves the grains for more than one year.

Rice is similarly preserved and also small pieces of coconut are kept in the container along with the rice. This also preserves the rice from the varieties of insects' infection.

Epidemic dropsy is a disease conveyed by infected rice. I do not know whether the above-mentioned methods of preserving rice are used in Bengal. How far castor oil or coconut oil works as a poison to these insects is a question of research.

Yours, etc.,

RAMANIK H. DESAI, L.C.P.S. (Bom),
L.T.M. (Cal)

SANTH PIPLI, NADIAD
(DISTRICT KAIRA),
11th March, 1935

A SIMPLE METHOD OF BUG DESTRUCTION

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—With reference to Dr J. N. Pacheco's article in your February number, 'A simple method of bug destruction', I remember the coconut oil remedy being

used in a hospital many years ago, but do not know why it was not more generally adopted in other institutions.

I desire to draw attention to the following procedure which seems to be a prophylactic against bug-breeding. Hospital cots, if painted blue, do not seem to have bugs in them, whereas other cots with other paints have abundance of these insects. This seems to be in conformity with an article I read some years ago in an English journal, that bedrooms painted blue have less mosquitoes than those of other colours.

Yours, etc.,

J. F. HENRIQUES, L.M. & S.,
F.C.P.S., B.M.S.

Superintendent, Mental Hospital.

RATNAGIRI,

14th March, 1935.

EPIDEMIOLOGY OF LEPROSY

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In the Bombay Presidency in general, and the Kolaba district (where I am working) in particular I have observed that the incidence of leprosy among Mohammedans is very low as compared with Hindi (of the same social status), although the habits and the conditions under which both these communities live are more or less identical. I believe this fact might have been noticed by other observers and leprosy workers also. I have no means of verifying this observation from statistical records and caste summaries, but people who have got these records at their disposal might be able to throw some light on this subject, and then it would be interesting to compare the percentage of leprosy incidence amongst Mohammedans of the Bombay Presidency with that of other provinces.

Yours, etc.,

ANNAJI V. GOKHALE,
Medical Officer,
Pui Leper Asylum

PUI,
KOLABA DISTRICT,
BOMBAY PRESIDENCY,
22nd March, 1935

INTRAMUSCULAR VERSUS INTRAVENOUS QUININE

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Dr. Adalja's letter on the above subject published in the January issue of the *Gazette*, p. 58, I have read with interest. He appears to be a great advocate of intramuscular quinine, for he not only used quinine by this route when indicated, but also expresses the opinion that in 85 per cent of cases quinine injection therapy is indicated. One can conceive that the percentage of cases requiring parenteral exhibition of the drug will vary in individual hands, but it is, I think, infliction of avoidable inconvenience, if 85 per cent of the cases are so treated as a routine. Most of the cases do well with oral administration. When the gastro-intestinal tract is angry, or when a quick therapy is indicated, the intravenous route should be the route of choice.

Though I have had considerable experience in intravenous quinine, I can count on my fingers the intramuscular injections I have given. Apart from the usual 'tetanus-vel-necrosis-phobia' associated with intramuscular quinine, my idea to use the intravenous channel has been to avoid pain and to prevent a frontal attack when indicated.

Dr. Adalja is indeed to be congratulated on his fortunate results. But it may be remarked that the criterion of success should be not the immediate control of an attack, but of avoiding relapses, and as it is not stated how many times the same individuals

occurred in the 5,000 cases, one is not in a position to comment further on the point. Anyway the letter suggests that he treated (rather cured!) each case with one intramuscular dose—indeed a great victory for the intramuscular route.

My experience in the intravenous field tells me that some of the cases who were in the habit of receiving intramuscular quinine, and had received several courses of these elsewhere, were simply amazed to see that they were relieved once for all of their periodic fever by two or three 'proper intravenous administrations'. Though I have seen such cases where intramuscular quinine failed and intravenous succeeded, I have yet to see a case where the reverse occurred. This is in itself a great point in favour of the intravenous quinine.

It may be hard to convince Dr. Adalja of the superiority of the intravenous route for he has no failures so far with the intramuscular channel, but one can venture to suggest that if he succeeds in persuading himself to give the intravenous route a fair trial and compare his notes, he will be amply convinced. There is nothing to be afraid of in intravenous quinine; if properly administered it is quite safe, effective, and quick.

In fine, one has to agree with the editor that the intravenous route should be the route of choice and that where injection is indicated the intravenous route should be given preference.

Yours, etc.,

R. L. SONI, M.B., B.S., F.R.I.C.S.

PAUNOM (BURMA),
5th March, 1935.

[We have read our editorial note again and we cannot agree that any definite preference for the intravenous route was expressed.

We specifically condemned intramuscular injection as a routine procedure; we do not consider that the routine administration by the intravenous channel deserves any less emphatic condemnation.—Editor, I.M.G.]

CONSERVATIVE SURGERY IN MALIGNANT DISEASE

To the Editor, THE INDIAN MEDICAL GAZETTE

DEAR SIR.—The paper on 'Conservative surgery in malignant disease' by Dr. T. Howard Somervell, appearing in your March issue, opens up several avenues of partly criticism and partly controversy.

Dr. Somervell gives a sarcoma patient 'a full course of deep x-ray therapy' to the growth and its immediate neighbourhood before operation. This course consists of five minutes of 5 milliamps at a 5-inch spark gap (90,000 volts), with a filter of 1 millimetre of aluminium at 15-inch target—skin distance. This dose is given every day for 10 days. I submit that such a course neither constitutes deep x-ray therapy at all, nor is a 'full' dose in any sense of the term as applied to a malignant growth. It probably would not produce 30 per cent of an erythema dose at a depth of 10 cm.

It used to be held some years ago that sarcomas were more radio-sensitive than epithelial growths and so required less radiation, and that at a lower voltage and filtration than carcinoma. While the facts of this lower 'lethal' dose is true as regards immediate results, the passage of time has shown that doses quite as large and at as low a wave length are necessary for the treatment of sarcoma, as of carcinoma, assuming that the object of treatment is to cure the disease.

After 'radical excision' of a growth Dr. Somervell leaves one milligram of radium in a needle per 1½ cm. of nerve tissue in cases where important nerves have become adherent to the growth. What filtration is used, and what is the radium concentration in these needles? Dr. Somervell is apparently in the habit of 'locally excising' bone sarcomas, or in the case of

giant-celled tumours of scooping out the contents. Both these procedures leave room for criticism.

In the case of bone sarcoma, whether of the osteogenic, 'endosteal' or Ewing's type, recent work has shown that the growth extends, as can be shown by serial sections, much further than can be seen either in a skiagram, or by naked-eye morbid appearances. In the case of long bones the disease before it is diagnosed has in the majority of cases infiltrated almost if not the whole length of the shaft. It will be obvious that the local removal of such a tumour, with three-quarters of an inch of 'healthy' bone on each side, will be of little use.

As to giant-celled tumours—the vexed question arises, what really are these growths? If considered as neoplasms of bone they certainly are not an entity in themselves—they almost certainly belong to one end of the sarcoma scale, the slowly-growing relatively-benign end, with little if any anaplasia, at first at any rate.

The actual giant cells, polynucleate, are probably a product of slow toxæmia by the toxin of the neoplasm, just as they are in the case of tubercular 'giant cells'. If the view of Looser, that giant-celled tumours are of the nature of granulomas which sometimes undergo sarcomatous changes, is held, then treatment will obviously be influenced by the radiographic appearances. If completely encapsuled by a shell of bone, the tumour may be subjected to a local 'scooping', with canterization as described by Dr. Somervell, such scooping being done in the interval between a 30 per cent fractional series of deep x-rays followed by a complete fractional course of 1,700 to 1,800 r. units per area at 200 k.v. and a filtration either of thoræus or 1 millimetre of copper, delivered in fourteen to fifteen days. It has been shown conclusively that the majority of giant-celled tumours react well to deep x-rays and keep well after treatment.

In cases where the skiagram shows signs of malignancy, that is to say where the tumour is rapidly growing and breaking down its bony walls to invade the soft tissues, then it should be treated as if it were a sarcoma, which in point of fact it probably is. It is a moot point whether such cases should be operated upon. In frank cases of sarcoma the results of deep x-ray therapy are at least as good without the added inconvenience of parting with a limb, or part of a limb. The vast majority of patients die as a result of distant metastases, whatever one does.

In cases of abdominal new growths, where the tumour is situated in the lower abdomen we can very often obtain gratifying results by deep x-ray therapy. I have in my series a case of inoperable adeno-carcinoma of the ovary in which a piece was removed for section to establish the diagnosis in 1924. The patient had deep x-ray therapy from me and is alive and well to-day.

In the upper abdomen radiation is of less value, but even here a good deal can be done by often repeated small doses at high voltage and filtration, modifying the method of Coutard.

It is doubtful if the harmful effects noted in these cases, vomiting, collapse *et seq.*, are due to histamine shock.

I am rather puzzled by the skiagram (figure 5 in the paper), labelled 'Non-osteogenic periosteal sarcoma'. Judging by the reproduction there is no evidence of any bone sarcoma at all; what did the section show?

As regards carcinoma of the breast, the work of Keynes, FitzWilliams and others has shown conclusively that treatment of early tumours by efficient radium needling alone has in many cases eradicated the disease. It is advisable to supplement such needling by a course of deep x-ray therapy. Where a carcinoma of the breast has advanced to the size of a walnut or more, and the classical signs, nipple retraction, etc., present with or without palpable involvement of the axillary lymph nodes, then probably

the ideal treatment consists of (a) a preliminary course of deep x-ray therapy to minimize the risk of metastasis by sterilizing any wandering cells in the lymphatics in addition to an inhibitive effect on the growth, (b) operation with the endothermy knife (or needle), and (c) a complete course of deep x-ray therapy, as soon as the stitches are out, using three areas, two glancing and one superior as advocated by Finzi and Levitt, giving about 1,250 r. units to each area in a fortnight, of hard rays.

In the case of carcinoma of the uterus, the most recent figures of Heymann at Stockholm, of Regaud and Lacassagne of Paris, Murdoch of Brussels, not to mention Donaldson, Roy Ward and Durden Smith of London, all show that the radium and deep x-ray 'cures' taken on a basis of five years with no sign of recurrence are better than the best operation figures of very selected cases, not excluding those of Mr. Victor Bonney, and this without the appalling operation mortality, which in most surgeons' hands reaches the level of 40 per cent.

Professor Heymann's figures up to 1928 are as follows :—

Five-year cases in different stages of cancer of the cervix, 1914 to 1928 inclusive

	Number treated	Number of five-year cases	Cure, per cent
Stage I	.. 141	81	57.5
" II	.. 403	138	34.3
" III	.. 557	90	16.2
" IV	.. 338	18	5.3

Results have improved since 1928 and it is confidently expected that in the most recent series at the

Radiumhemmet of Stockholm the figures will be very much better even than the above.

Professor Heymann gave us an idea of these figures at the Fourth International Congress of Radiology at Zurich last summer and I seem to remember the figure being as high as 70 per cent in group I cases. This communication will no doubt be published in the Proceedings of the Congress. In any case it must be patent that, even allowing for the exceptionally gifted hands of Mr. Victor Bonney, Wertheim's operation is as dead as the Dodo.

With further advances in the technique of tele-radium treatment (the radium 'bomb') and in deep x-rays of extremely short wave length generated by plants delivering a potential of the order of a million volts, we might reasonably expect to get, and as a matter of fact are getting, nearer and nearer daily to the solution of the cancer problem.

It is not by any means my intention to disparage the very excellent work being done by Dr. Somervell at his Mission Hospital, limited, as he probably is, by want of proper deep x-ray therapy plant and an adequate supply of radium, but I wish to point out that the methods he describes are far from being the last word in the 'conservative' treatment of malignant disease.

Yours, etc.,

G. GALSTAUN, M.A., D.M.R.E. (Cantab.),
M.R.C.S., L.R.C.P. (Lond.),
Honorary Radiologist.

MEDICAL COLLEGE HOSPITALS,
CALCUTTA,
19th April, 1935.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL R. S. TOWNSEND, M.C., Civil Surgeon, Lucknow, is appointed to officiate as Inspector-General of Civil Hospitals, United Provinces, with effect from the 21st December, 1934, until further orders *vice* Colonel A. H. Proctor, granted leave preparatory to retirement.

Lieutenant-Colonel R. N. Chopra, C.I.E., Professor of Pharmacology, School of Tropical Medicine, Calcutta, is appointed to act as Director of the School in addition to his own duties, with effect from the 9th January, 1935, until further orders.

Lieutenant-Colonel W. P. Hogg, Residency Surgeon, Mewar, is appointed to officiate as Resident in Mewar and Political Agent, Southern Rajputana States, in addition to his own duties, with effect from the afternoon of the 12th February, 1935, and until further orders.

Lieutenant-Colonel F. A. Barker, O.B.E., is appointed to officiate as Deputy Director-General, with effect from the 22nd February, 1935, until further orders.

Lieutenant-Colonel B. H. Singh, M.C., Civil Surgeon of Burdwan, is appointed to act, until further orders, as Principal, Medical College, and Superintendent of the Medical College Hospitals, Calcutta, *vice* Lieutenant-Colonel T. C. Boyd.

Lieutenant-Colonel P. Banerji, Civil Surgeon, Chittagong, on relief, is appointed to act, until further orders, as Civil Surgeon, 24-Parganas, *vice* Lieutenant-Colonel K. S. Thakur.

The services of Major B. P. Baliga are placed at the disposal of the Government of Bengal for employment in the Jail Department, with effect from the date on which he assumes charge of his duties.

On return from leave Captain H. W. Mulligan, an officer of the Medical Research Department, is placed on foreign service under the I. R. F. A. for appointment as Assistant Director, Malaria Survey of India,

Kasauli, with effect from the date on which he assumes charge of his duties.

Major R. C. Wats, an officer of the Medical Research Department, on reversion from foreign service under the Indian Research Fund Association, is appointed as Supernumerary Officer at the Haffkine Institute, Bombay, with effect from the date on which he assumes charge of his duties.

Major A. M. V. Hesterlow is appointed to officiate as Director of Public Health for the Government of Bombay, *vice* Major A. Y. Dabholkar, M.C., proceeding on leave.

Major S. A. McSwiney, Civil Surgeon, Darjeeling, is appointed to act, until further orders, as Professor of Midwifery, Medical College, and Obstetric Physician and Surgeon, Medical College Hospitals, Calcutta, during the absence, on leave, of Lieutenant-Colonel Gow.

Major T. H. Thomas, Civil Surgeon, Dacca, on relief, is appointed, until further orders, as Civil Surgeon, Darjeeling, *vice* Major S. A. McSwiney.

The services of Captain H. H. Mahmood are placed at the disposal of the Government of the N. W. F. P. for employment in the Jail Department, with effect from the date on which he assumes charge of his duties.

Captain B. Chaudhuri is appointed to be Senior Medical Officer, Port Blair, with effect from the 19th April, 1935, or any subsequent date on which he assumes charge of his duties.

Captain R. Linton, Civil Surgeon, Bakarganj, on relief, is appointed, until further orders, as Civil Surgeon, Dacca, *vice* Major T. H. Thomas.

Captain G. B. W. Fisher, Civil Surgeon, Burdwan, on relief, is appointed to act as Civil Surgeon, Chittagong, *vice* Lieutenant-Colonel P. Banerji.

LEAVE

Colonel A. H. Proctor, D.S.O., V.H.S., Inspector-General of Civil Hospitals, United Provinces, is granted leave on average pay for three months and two days combined with leave on half average pay for a total period of eight months, with effect from the 21st December, 1934, preparatory to retirement.

Lieutenant-Colonel T. C. Boyd, Principal, Medical College, and Superintendent of the Medical College Hospitals, Calcutta, is granted leave for the period from the 14th March, 1935, or from the date of relief to the 14th October, 1935.

Lieutenant-Colonel P. F. Gow, Professor of Midwifery, Medical College, and Obstetric Physician and Surgeon, Medical College Hospitals, Calcutta, is granted leave on average pay from the 8th April, 1935, or from the date of relief to the 30th September, 1935.

Lieutenant-Colonel K. S. Thakur, Civil Surgeon, 24-Parganas, is granted leave *ex-India* for seven months, with effect from the 23rd April, 1935, or from the date of relief.

Captain V. A. Edge, Senior Medical Officer, Port Blair, is granted leave for 3 months and 16 days, with effect from the 23rd April, 1935, on the expiry of which his services are replaced at the disposal of the Army Department. Previous notification is hereby cancelled.

REMOVAL FROM SERVICE

Captain E. G. Michelson is removed from the Service, His Majesty having no further need of his services, 29th November, 1934.

Captain J. J. Quinlan is removed from the Service, His Majesty having no further need of his services, 16th January, 1935.

PROMOTION

To be Captain (on prob.)

Roland Lionel Raymond, 25th January, 1935, with seniority as Lieutenant 25th January, 1931, and as Captain 25th January, 1934.

RETIREMENT

Lieutenant-Colonel D. D. Kamat. Dated 1st March, 1935.

Notes

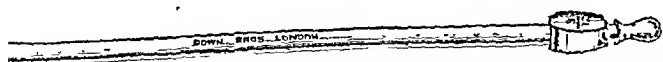
A COMBINED URETHRAL DILATING BOUGIE AND CATHETER

By MILROY PAUL, M.S. (Lond.), M.R.C.P. (Lond.)
F.R.C.S. (Eng.)

THIS set of bougies was made to my design by Messrs. Down Brothers, Limited, London.

The bougies have the shape of the well-known Lister's bougies and in addition each bougie has a narrow tubular channel running through its long axis, and are made in 3 sizes 4/7, 6/9, 8/11 Eng. gauge.

These bougies were designed to obviate the necessity for passing a metal catheter, in dealing with that common surgical emergency acute retention of urine from an urethral stricture.



As every surgeon knows, the passage of a bougie through a stricture is much easier than the passage of a metal catheter, even though the stricture has been first dilated by the bougie.
The slow emptying of the bladder through the

in this type of case. To the comparatively inexperienced worker, the flow of urine through the channel in the bougie is welcome confirmation of the successful passage of the bougie into the bladder.

The bougies have proved very satisfactory in practice, as they are passed more easily than a metal catheter owing to their greater weight, better balance, and their bulbous ends, and I also prefer to use them instead of a metal catheter in cases of enlarged prostate, where occasionally it is necessary to use a metal catheter to relieve acute retention.

The lesser liability to trauma of the urethral walls makes blocking of the lumen of these bougies with blood clot a rarer event than was the case with the metal catheter whose eye often blocked with soft clot, when being used in a difficult stricture case.

'HYPOLOID' CALCIUM LÆVULATE

BURROUGHS WELLCOME AND COMPANY, Snow Hill Buildings, London, E.C.1, have issued 'Hypoloid' calcium lævulate in ampoules of 1 gramme.

This product has been introduced to meet the demand for a calcium product for injection in cases where calcium therapy is indicated. It contains 14.8 per cent of calcium and is non-toxic in therapeutic doses.

'Hypoloid' calcium lævulate is indicated in the treatment of tetany, in the vomiting of intestinal obstruction, in coeliac rickets and as a pre-operative measure in various surgical operations.

It is issued in boxes of 5 'Hypoloid' ampoules.

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Original Articles

SOME BIOCHEMICAL OBSERVATIONS ON ASTHMA

By DHARMENDRA, M.B., B.S.

and

L. EVERARD NAPIER, M.B.C.S., L.R.C.P.

Calcutta School of Tropical Medicine

IN a previous paper (Acton and Dharmendra, 1933) it has been shown that amongst Indians bronchial asthma, *i.e.*, asthma secondary to some disease or infection of the respiratory tract, preponderates, and that asthma as a result of hypersensitiveness to pollens, animal emanations, such as horse hair, cat hair or chicken feathers, and to specific foods, such as egg and milk, is rare. Allergic asthma amongst Indians is usually dependent upon some abnormal condition in the gut, such as intestinal amebiasis or hookworm infection. But only a small percentage of the patients with chronic bronchitis or with these intestinal infections suffer from asthma; there was, therefore, some factor which differentiates the group that develops asthma from those that do not.

The biochemical investigations of Barber and Oriel pointed to a liver dysfunction existing amongst allergies; the results of liver-function tests carried out by Bray in a series of allergic children pointed to the same condition.

Acton and Dharmendra suggested that in cases of intestinal infections where the liver function is normal the toxic substances formed in and absorbed from the intestines are detoxicated in the liver, whereas, if the defence mechanism of the liver is lowered by amebic or some other form of hepatitis, the offending substances may pass through the liver unchanged, reach the general circulation and produce symptoms. In the present series of cases we have investigated certain biochemical changes amongst asthmatic patients in this country.

In addition to the examinations already detailed in the previous paper (eosinophil count, Arneth count, stool and sputum examination, skiagram of the chest, von Pirquet and dermal tests), special tests for sympathicotonia (the adrenalin test), for liver function (lævulose tolerance test, adrenalin test, van den Bergh test, determination of icterus index, examination of urine for bile, urobilin and indican), and for gastric function (fractional gastric analysis) were done in this series.

A diagnosis of the type (*vide* Acton and Dharmendra, 1933) was first made from the history and clinical symptoms of the patient, and from the blood, stool, roentgenographical, and nasal examinations and dermal tests.

In all, 42 cases were investigated. Analysis of only 40 cases will be presented in this paper;

two cases have been eliminated from the series, as one proved to be a case of right-heart failure and in the other there was active pulmonary tuberculosis in both lungs.

Amongst the 40 cases taken for analysis there are 11 in which the skiagram showed definite or suspicious signs of old apical lesions or of early infiltration of the apex. These cases have been included in the analysis because the lesions were not sufficiently advanced to be held responsible for the dyspnoea; in the cases showing early infiltration the asthma was of long standing, and the biochemical findings did not differ from those in the other cases of the series.

Of the 40 cases analysed in the paper, 27 were bronchial cases, *i.e.*, cases secondary to bronchial infection, 7 were cases of allergic asthma, while the remaining 6 were of the mixed type.

Before describing the results obtained with the biochemical tests we will very shortly describe the results of the blood and stool examination, of the radiological examination of the lungs, and of the von Pirquet test. The significance of these tests have already been considered in previous papers.

Blood eosinophilia.—The blood eosinophils were below 1,000 in 24 cases, and above 1,000 in 16 cases. The Arneth index and eosinophil count in the different types is shown in table I.

TABLE I

Type	Total number of cases	Eosinophils below 1,000 per c.mm.	Eosinophils above 1,000 per c.mm.	Arneth index above 70	Arneth index below 70
Bronchial	27	19	8	25	2
Mixed bronchial and allergic.	6	2	4	5	1
Allergic	7	3	4	2	5

Out of the 8 bronchial cases with a count of above 1,000 eosinophils per c.mm. of blood, two had the Gram-negative bacilli in their sputa.

Radiological evidence of tuberculosis.—This was found in 11 cases, 9 of which belonged to the bronchial and 2 to the mixed bronchial and allergic types. In 4 cases there were very old apical lesions, in 2 suspicious infiltration of the right upper lobe, in 4 definite early infiltration of the right or of the left upper lobe, while in 1 there was early infiltration of both the upper lobes.

The von Pirquet test.—This was done in 38 out of the 40 cases. It was positive in 22, doubtful in 3, and negative in 13 cases.

For purpose of interpreting the results of the von Pirquet test we will consider the bronchial and the mixed cases under one group, and the

allergic cases under another group. The results are summarized in table II.

TABLE II

Type	Total number of cases	Number of cases in which the von Pirquet test was done	RESULT		
			Positive	Slight positive	Negative
Bronchial, and mixed bronchial and gut cases.	33	31	21	3	7
The allergic cases	7	7	1	..	6
TOTAL ..	40	38	22	3	13

The 31 bronchial and mixed bronchial and gut cases in which the von Pirquet test was done included the 11 cases showing radiological evidence of tuberculosis; in all of these a positive von Pirquet was obtained, but in 2 it was weakly positive, whereas amongst the rest, i.e., cases in which there was no radiological evidence of tuberculosis, the test was definitely negative in 7, weakly positive in one, and positive in 12.

Blood sugar.—This was estimated in 39 out of the 40 cases. In all the cases blood from a vein at the elbow was taken from the fasting patient. The blood sugar ranged from 66 mgm. per 100 c.cm. to 100 mgm. per 100 c.cm., i.e., from 0.066 per cent to 0.100 per cent. In the majority of cases it was between 66 and 75 mgm. per 100 c.cm.; 20 cases had this value, in 12 it was between 76 and 80 mgm. per 100 c.cm. and in 7 cases it was between 81 and 100 mgm. per 100 c.cm. The mean value was 74.48 mgm. and the standard deviation from the mean ± 9.15 mgm. Table III gives the blood-sugar values of the cases of different types.

In the 33 bronchial cases the mean was 75.46 ± 10.98 and in the 6 allergic 71 ± 4.32 . The difference between these two means is not 'significant'.

TABLE III

Type of cases	Total number	Number in which blood sugar was estimated	BLOOD SUGAR VALUES, IN MG. PER C.CM.		
			66 to 75	76 to 80	81 to 100
Bronchial ..	27	27	14	7	6
Bronchial and gut ..	6	6	1	4	1
Allergic ..	7	6	5	1	..
TOTAL ..	40	39	20	12	7

In no case was the blood sugar above normal, it was normal in only seven, in 20 cases it was definitely below normal, and in 12 cases the figures were towards the low side of normal. Low blood sugar values have been found by other workers in asthma and allergy.

Payne and Bray (Bray, 1931) in a series of 55 allergic children found that 36 out of 55 showed a value below normal. Malone (*loc. cit.*) obtained low blood sugar values in a series of fifteen cases of bronchial asthma associated with suspected food allergy. Knott, Oriel and Witts (1930) at Guy's Hospital found in 62 out of 148 cases of asthma, i.e., in 42 per cent of the cases, the blood sugar below normal. Osman (1929) describes 4 cases of typical bronchial asthma in children who had been rendered entirely free from attacks by the simple addition of sugar to the diet.

Adrenalin test.—Adrenalin stimulates the sympathetic side of the autonomic nervous system. A subcutaneous injection accelerates the pulse rate and increases the systolic pressure, and there is an increase in the blood sugar from mobilization of the liver glycogen. A subcutaneous injection that normally raises the blood-sugar level has no action on the blood sugar after hepatectomy; this indicates that the blood sugar is raised by its action on the glycogen of the liver. This action of raising the blood-sugar level we will consider when discussing the liver-function tests, for the present we will refer only to the action on the pulse rate and systolic blood pressure.

Goetsch (Englebach, 1932) originally introduced the 'adrenalin test' for indicating hypersensitiveness of the autonomic nervous system. According to him, after a subcutaneous injection of 0.5 c.cm. adrenalin an increase of 20 per minute in the pulse rate and 20 mm. of systolic blood pressure indicates a positive reaction. He maintained that such a positive reaction, indicating hypersensitiveness of the autonomic nervous system, was constantly associated with hyperthyroidism. Englebach (1932) discredits the value of the test, as he obtained positive results in both endocrine and non-endocrine disorders, frequently in normal individuals, and in 3 cases in which the thyroid gland had been completely removed. From his results of the adrenalin reaction on 1,066 cases of endocrine disorders he concludes that it occurs more or less frequently in all endocrine disorders, that it occurs as frequently with the hypo-activities as with the hyper-activities of the different glands, and that the variability in this reaction was so great that no deduction could be drawn with regard to its effect upon the sensitiveness of the autonomic nervous system.

Technique.—Englebach (1932) suggests that the test be done during the morning or afternoon at least one hour after meals and at a time when the patient is free from emotion and the effects of unusual muscular exertion. In our cases, along with its effects on blood pressure, we had to test the effects of the adrenalin injection on the blood sugar also, so that all our tests were done in the morning on a fasting patient. After the patient had been in bed for some time and was physically and mentally quite calm, his pulse rate and systolic blood pressure were recorded every five minutes until constant results were obtained. Half a

cubic centimetre of a 1/1,000 solution of adrenalin hydrochloride was then injected subcutaneously. The effect of the injection on the blood pressure and pulse rate was noted. We took the readings three-quarters of an hour and again one and a half hours after the injection.

Englebach (1932) considers a variation of or within 20 mm. and 20 beats per minute below or above the recorded stationary pressure and pulse rate before the injection was given to be within the normal limits. A reduction in blood pressure of 20 mm. or more is considered a positive reaction. Similarly a decrease of 20 beats or more in the pulse rate is considered a negative reaction and an increase of 20 beats or more a positive reaction.

We did the test in 37 of the 40 cases and in all of them found the changes within normal limits. The results were also normal in the two cases not included in the analysis, one of right-heart failure with emphysema and the other of tuberculosis.

In our series the general reactions were very infrequent, and consisted only of slight tremors in a few of the cases. The general reaction may be more marked and cause tremors, twitching, pallor, nervousness, restlessness, palpitation, nausea, vomiting and sometimes a chill. Englebach does not consider the general reactions abnormal as they occur in a large percentage of normal individuals. The absence of such symptoms he considers as evidence that the patient can tolerate a larger dose of adrenalin than an average individual.

Blood pressure.—This was recorded in 37 out of the 40 cases. In all the cases the reading was taken in the morning before the patient had eaten anything. The systolic pressure ranged between 95 and 125 mm., except in the case of a child of 8 years in whom it was only 75 mm. In 3 cases it was 95, in 8 cases 100, in 3 cases 105, in 11 cases 110, in 1 case 115, in 8 cases 120, and in 2 cases 125; so that only in 11 out of 37 cases it was above 110. Of the 37 cases the ages of 22 were above 30 years (between 30 and 50 years), of 14 were between 20 and 30 years and one patient was a child of 8 years. Taking into consideration the ages of the patients all the readings were on the low side; in 26 cases they were decidedly low (75 to 110). The low blood pressure cannot be accounted for by inclusion in the analysis of the patients showing some radiological evidence of tuberculosis, as the mean of the systolic blood pressure of the whole series was 110.68 mm. Hg. whereas of those with evidence of tuberculosis it was 109.55 mm. Hg. Arranged according to ages the mean of the systolic pressures was 110.7 in the 20–30 age group, 105 in the 31–40 group, 110.8 in the 41–50 age group, and 118.3 above 50 years.

Alexander, Luten and Kountz (1927) in a series of 50 cases of bronchial asthma of all ages in whom the condition had been present at least for five years report almost universally low blood pressures.

Adam (1932) finds that in 1,500 cases of asthma only in 10.7 per cent was the blood pressure below normal, in 7.5 per cent it was above normal and the remaining cases had a normal pressure. Knott, Orie. and Witts (1930) determined the pressure in 79 cases above the age of 10 years. The values in early life were normal, and rather high after the age of 40 years.

Hypo-adrenia.—The low blood pressure and hypoglycaemia point to a deficiency of adrenalin in these patients. A connection between the onset of asthma and dysfunction of the endocrine glands, especially the adrenals, thyroid and thymus, has often been suggested.

Hurst (1930) suggested that attacks of asthma might be due to deficient secretion of suprarenal glands, which causes a hypotonus of the sympathetic nervous system, thus allowing the vagal constituent to obtain the upper hand. Drummond (1923) believes the suprarenal inadequacy to be the fundamental fault in the incidence of asthma. Bray (1931) suggests the possibility of intermittent dysfunction of the suprarenals instead of organic destruction as the characteristic low blood pressure and intense prostration is not present between the attacks.

There is both experimental and clinical evidence in favour of the adrenal deficiency theory. Hajos (1926) finds that sensitiveness in experimental anaphylaxis is increased by thyroid extract and by insulin and is decreased by adrenalin, parathyroid extract and extract of the posterior lobe of the hypophysis. He thinks that clinical anaphylactic sensitiveness and idiosyncratic symptoms are increased in hyperthyroidism, exophthalmic goitre and under insulin and thymus treatment, and is decreased by adrenalin, parathyroid extract and that of the posterior lobe of the hypophysis. Many workers have found that white rats suffering from suprarenal insufficiency are more susceptible than normal rats to histamine, a substance whose actions, both local and general, resemble anaphylactic phenomena so closely. Crivellari (1927) showed that suprarenalectomized rats were 12.5 times more susceptible to histamine phosphate than were normal rats. Marmorston-Gottesman and Gottesman (1928) found that their suprarenalectomized rats were about 20 times more susceptible to histamine-acid-phosphate than were normal rats. Scott (1928) found that most doubly-suprarenalectomized rats were killed by doses that produced only transient symptoms in control rats. Wyman (1928) found that suprarenalectomy or blank operation did not increase the susceptibility of rats to histamine, whereas a double suprarenalectomy increased the susceptibility about 15 times.

Adam (1932) has produced post-mortem evidence to prove the presence of hypo-adrenia in cases of asthma. In a woman of 41, asthmatic for 9 years, necropsy showed that the adrenal medulla was almost wholly destroyed. He quotes two cases of Cameron, one with asthma for 10 years and the other for 20 years, in whom there were similar necropsy findings (almost complete destruction of the adrenal medulla). In one of the three necropsies the cortex was oedematous, in one it contained collections of leucocytes and in the third the whole gland was extremely small.

Cramer and Magee (Adam, 1932) have suggested an explanation for this hypo-adrenia, they have shown that toxic products absorbed from the intestine or elsewhere first stimulate then exhaust the adrenals.

More recently Burn (1933) as a result of his experimental work has drawn attention to a function of adrenalin in the circulation in relation to the sympathetic system. He says the results indicate that the efficiency of the sympathetic nerve (that is to say the size of the response elicited by a given impulse passing down a sympathetic nerve) depends upon the amount of adrenalin in circulation in the blood. In

other words the persons in whom the amount of circulating adrenalin is abnormally low will possess a relatively inefficient sympathetic system and will be predisposed to asthma. Should any chronic inflammatory change develop, leading either to a direct or to a reflex diminution of the bronchiolar airway, those patients will be unable to dilate their bronchioles and will suffer an asthmatic attack. He suggests the addition of some precursors of adrenalin to the diet of asthmatics.

Urinary proteoses.—The ether reaction for proteoses was done in 40 cases with positive results in 36 and negative in 4. The substance was isolated in a group of 9 cases and was used for dermal tests. The dermal tests with each of the 9 proteoses were done on the ease from which it was isolated and on the other 8 cases of the group. No positive result was obtained in any case.

In 3 cases intradermal tests with their own proteoses were tried and in all of these a reaction of inflammatory type was obtained.

The isolation of the urinary proteoses and their use for dermal and intradermal tests was given up, on account of these findings, which, although not extensive, tend to show lack of specificity in the skin reactions with the substance. Moreover, the literature on the subject contains many contradictory statements. While Barber and Oriel (Barber and Oriel, 1928, Oriel and Barber, 1930, Oriel, 1930, 1931 and 1932) are quite definite about the specificity of these proteoses and claim to have obtained remarkable therapeutic results with them, there are other workers (Lyon, Pereival and Stewart, 1932; Freeman, 1932; Cormia, 1933) who refute emphatically the suggestion that they are of any therapeutic value.

Stool findings.—Hookworm ova were found in 5 cases, *Entamoeba histolytica* in 4 and *Bact. pseudo-carolinus* in 3. Enterococci in abundance were found in 20 of the 40 cases and *Bact. lactis aerogenes* in 10. These findings (enterococci and *Bact. lactis aerogenes*) point to intestinal stasis, and this is supported by the presence of indican in the urines of the majority of the cases (37 out of 40 cases had indican in their urine).

Adam (1926) believes the increase in ethereal sulphates to be evidence of intestinal putrefaction; this intestinal putrefaction may give rise not only to such substances such as indol and skatol, which are excreted as ethereal sulphates, but to histamine, which is the one protein derivative known to produce symptoms similar to those of asthma and anaphylactic shock. Clifford Mitchell (Adam, 1926) notes that his most extreme examples of indicanuria were in patients suffering from bronchospasm. He believes that the presence of indican 'in conspicuously large amount in proportion to other normal constituents is almost an infallible sign of a toxic state'. Indican presents only an index of this toxic state, but there may be, as Mitchell points out, other so-far-undiscovered poisons formed in the intestinal canal, which are responsible for the toxic state. Barber and Oriel (1928) in their biochemical investigation of allergic conditions obtained findings similar to those obtained in human cases of intestinal obstruction and in the experimental

intestinal obstruction in animals by Louria (1921) and Haden and Orr (1923).

Evidence of intestinal stasis and pathological conditions of the gut are important, especially in view of the work of Schloss, Walzer and others showing the passage of unaltered food protein from the intestines into the circulation.

Mellanby and Twort (1912) and Hanke and Koessler (1922) demonstrated the presence of histamine-producing organisms in the intestinal tract of man and experimental animals.

Ascoli in 1902 (Walzer, 1927) by means of precipitin reactions detected the presence of egg-white in the blood of normal individuals about 1½ hours after the egg was eaten.

Schloss and Worthen (1916) by means of precipitin and anaphylactic tests showed that the blood of most marasmic infants contains precipitin for cow's milk at some period of the disease, indicating preceding enteral absorption of the antigen-protein from cow's milk. Schloss and Anderson (1922) produced evidence to indicate that under certain conditions the intestinal tract of infants was permeable to slightly altered or unaltered protein. They consider that such passage of unaltered or partially digested protein was specially apt to occur in mal-nourished infants or in those suffering from diarrhoea.

Anderson, Schloss and Myers (1925) found precipitins in the blood of normal infants after the addition of such proteins as cow's milk, egg albumin, sheep serum and almond to their routine diet. In marasmic infants, however, relatively large amounts of the antigenic protein were absorbed and the absorption continued over a much longer period of time than in normal infants, as judged by the degree of precipitin formation and the duration of precipitin in the blood. Walzer (1927) by first passively and locally sensitizing the skin of a person to a particular food with the serum of patients sensitive to that food and then feeding the person with that particular food was able to produce weals at the sensitized site proving the enteral entrance into the blood stream of some of the ingested protein in an unaltered state. He studied the reaction in over 200 individuals and concluded that absorption of such unaltered protein through the intestinal canal is a normal physiological phenomenon.

Bruner and Walzer (1928) using the same methods found that the absorption of detectable amounts of unaltered fish protein from the digestive tract was a normal phenomenon. Sussman, Davidson and Walzer (1928) consider the absorption of amounts of egg protein from the digestive tract as a normal phenomenon.

Lewis and Grant (1926) working independently also proved the absorption of unaltered protein from the digestive tract by the same methods. They obtained serum from an adult markedly sensitive to fish. With this serum they locally sensitized a skin site on a normal subject and 18 hours later fed him with fish. Within an hour, a weal with pruritus and erythema appeared at the passively sensitized site.

Freeman (1925) locally sensitized his middle turbinate bone with the serum of an egg-sensitive patient; later he took egg flip and had itching and an uncomfortable sensation in the nose, thus proving that absorption of unaltered protein into the circulation through the enteral canal could play an important part in the production of paroxysmal rhinorrhoea. Later (1930) he carried out another experiment to show this passage of food-stuffs from the gut into the circulation. The skin of the forearm of two students was injected with a serum from a fish-sensitive patient and into the other forearm he put some of his own serum as control. One student was given a dinner consisting of a considerable amount of fish, the other had no fish. The forearm of the first student became red and swollen where the serum from the fish-sensitive patient had been injected, while the forearm of the

other student did not react at all. Two days later the second student had a cod stake and shortly afterwards developed a most marked reaction.

All the work quoted above conclusively shows the possibilities of absorption of unaltered protein from the digestive tract producing allergic symptoms. The work of Schloss and his co-workers has shown that in the presence of gastro-intestinal disturbances relatively large amounts of the antigenic protein are absorbed and the absorption is carried over a much longer period.

Ganghofner and Langer in 1904 (Walzer, 1927) by means of precipitin tests had shown the importance of trauma of the intestinal mucous membrane in adults in connection with the absorption of unaltered protein. O'Keefe (1927) rightly suggests that faulty digestion by producing irritating intestinal contents might cause a change in the permeability of the capillaries in the villi of the small intestine and thus affect the amount and rate of protein absorption.

As regards the second factor, histamine is formed by decarboxylation (splitting off of CO_2) of histidine which is a compound of every protein. It has a most marked toxic action; the fundamental and characteristic feature of its action is its direct stimulant effect on the plain muscles. It also relaxes and increases the permeability of the endothelial cell layer. Barger and Dale (1910) at first isolated it as an active factor of ergot. Later they (1911) isolated the substance from the gut. Since then with other workers they have shown its presence in most of the tissues of the body.

Dale (1929) considers histamine as a 'generally distributed constituent of the cells of the animal body, inert while it remained within the cell, but intensely active in producing local vasodilator reaction when appropriate stimuli release it from the cell into the tissue fluid, either free or in molecular combination of varying complexity'.

A good deal of interest has centered round histamine because of its wide distribution amongst the body tissues and because of the similarity of its local and general reactions to the local and general anaphylactic phenomenon.

From the great similarity between the histamine reaction and the anaphylactic phenomenon—both the local and general reactions—Lewis (1927) postulated a single fundamental cause to explain the two. He concluded that the response in anaphylaxis was due to release of his H-substance (which is either histamine or has histamine-like reaction) by the anaphylactic injury from the sensitized cells. Dale (1929) considers that such a conception fits all the known facts. He thinks that it is only the sensitized cells that react but 'the histamine might be liberated from the reacting cells or anaphylactic injury of the cells of some larger organ, such as the liver, might liberate histamine into the general circulation in such quantity as to produce its effects in the body generally'. So that the presence of histamine and of organisms capable of producing this substance from histidine in the gut might have a far-reaching importance.

Mellanby and Twort (1912) described the presence of histamine in the intestinal wall and isolated a bacterium from the alimentary canal which converted histidine into histamine. They considered the presence of histamine in the gut of pathological importance. Mellanby (1911) considered that the condition of cyclical vomiting in children—a condition included under allergic diseases—might be due to excessive accumulation of substances like histamine in the gut. He carried out an experimental investigation (1916) into the diarrhoeas and vomiting of children and considered histamine of importance in this connection.

Mellanby and Twort (1912) suggested it as a probability that under normal conditions the liver could deal adequately with histamine as it could with the amines, tyrosine and tryptophane, and render it innocuous, but if this defensive mechanism of the liver broke down for any reason, then many toxic symptoms would follow. This suggestion of Mellanby and

Twort has been refuted by the experimental work of Hanke and Koessler (1924) as far as histamine is concerned, as they have shown that this substance is not detoxicated in the liver, but is made physiologically inert during its passage through the intestinal wall. It is very probable that we have to deal with not only the absorption of histamine from the gut but also of various other allied, but so far undiscovered, toxins and that the liver plays an important rôle in their detoxication as there is clear evidence of deficient liver function in allergies. Dale and Richards (1918) pointed out that the action of histamine did not stand by itself but represented in its most characteristic features a type of action common to a large group of poisonous substances of animal or bacterial origin, poisoning of the capillary endothelium being the common factor in the action of all. It is possible and indeed probable that while the liver is not concerned in detoxicating histamine it may be of definite importance in connection with the detoxication of at least some of the other toxins and that the failure of the defence mechanism of the liver leads to grave symptoms due to the poisonous products of intestinal origin passing unchanged into the general circulation.

Hanke and Koessler (1922 and 1924) found histamine-producing organisms in the intestinal tract. They considered histamine to be a normal constituent of the contents of the large intestine of man and concluded that some of the amine was absorbed as such.

Thus the presence of histamine in the gut and its absorption through the intestinal mucosa has been shown to be a normal occurrence, but Mellanby (1916) has shown that the absorption of this substance through the intestinal mucosa differs in different circumstances. It may be that it produces symptoms when produced and absorbed in comparatively very large amounts. But the possibilities of the histamine produced in the gut reaching the circulation in a physiologically active form in amounts to produce symptoms are very few unless there is considerable injury to the intestinal wall or there is deficiency of histaminase, which is a histamine inactivating substance found by Best and McHenry (1930). And then Dale (1929) finds that histamine is practically limited in its action to the immediate neighbourhood of its liberation. He showed that when present in the general circulation it called forth secretion of adrenalin which neutralized its action. Histamine, then, if it reaches the general circulation in an active form, can only act in the presence of deficient adrenal secretion. It does not therefore seem very probable that histamine produced in the gut produces symptoms by its direct action on the far off tissues. But it can act in another way, i.e., by its local action in increasing the permeability of the intestinal mucosa and thus facilitating absorption of specific food proteins, products of protein digestion and toxic substances of bacterial origin which in their turn act on the tissues and produce symptoms. The views of O'Keefe on this point have already been alluded to. In his opinion the faulty digestion, by producing irritating intestinal contents, might cause a change in the permeability of the capillaries in the villi of the small intestine and thus affect the amount and rate of protein absorption. The absorption of larger amounts of antigenic proteins and the continuation of the absorption over much longer periods in infants with gastro-intestinal disturbances than in normals, as found by Schloss, supports this view.

Fractional gastric analysis.—Asthmatics are said to have a tendency to achlorhydria or diminished acidity.

Maxwell (1925), in 30 non-sensitive asthmatics, reports a complete absence of hydrochloric acid in 40 per cent of his cases and in 73 per cent the free acid reading was less than 20. Criepe and McElroy (1928) amongst 36 asthmatics found achylia present in 2 cases, achlorhydria in 10, hypo-acidity (less than 10) in 12, and normal acidity in 12 cases. Hurst (1930) found in 61 adult cases of asthma that curves below

normal occurred in about 20 per cent more asthmatics than normals. In a series of 200 asthmatic children in whom Bray (1931) did a fractional gastric analysis he found that in 9 per cent of the cases there was a complete absence of hydrochloric acid, in 48 per cent there was a pronounced hypochlorhydria, and in 23 per cent a mild hypochlorhydria so that in 80 per cent of these asthmatic children the hydrochloric acid was below normal. Bray points out that the hypochlorhydria in childhood is most frequent in the earlier years of life when food sensitization is most frequent and he suggests that this is one of the methods by which foreign protein gains easy access to the body, the reaction-producing substances not being destroyed in the digestive tract. He advocates the use of hydrochloric acid in the treatment of asthma and other allergic conditions of children.

Acid therapy of allergic conditions had long been advocated by other workers. Bishop (1893) recommended the use of hydrochloric acid in hay-fever as early as 1893. Crip and McElroy (1928) found acid therapy of value in occasional cases of urticaria and Scheer successfully treated eczema in infants and young children with the use of milk acidified with hydrochloric acid.

We did fractional gastric analyses in 30 out of our 40 cases. Hypo-acidity was present in

TABLE IV

Type of cases	Total number	Number in which gastric analysis was done	Hyper-acidity	Normal	Hypo-acidity
Bronchial ..	27	22	11	10	1
Bronchial and gut ..	6	6	3	3	..
Allergic ..	6	2	..	2	..
TOTAL ..	39	30	14	15	1

The ages of the asthmatic individuals in whom gastric analysis was done varied between 20 and 56 years.

Evidence of damaged liver, as shown by the l  vulose tolerance test, was more marked in the cases with hyperchlorhydria than in those with normal acidity (table V).

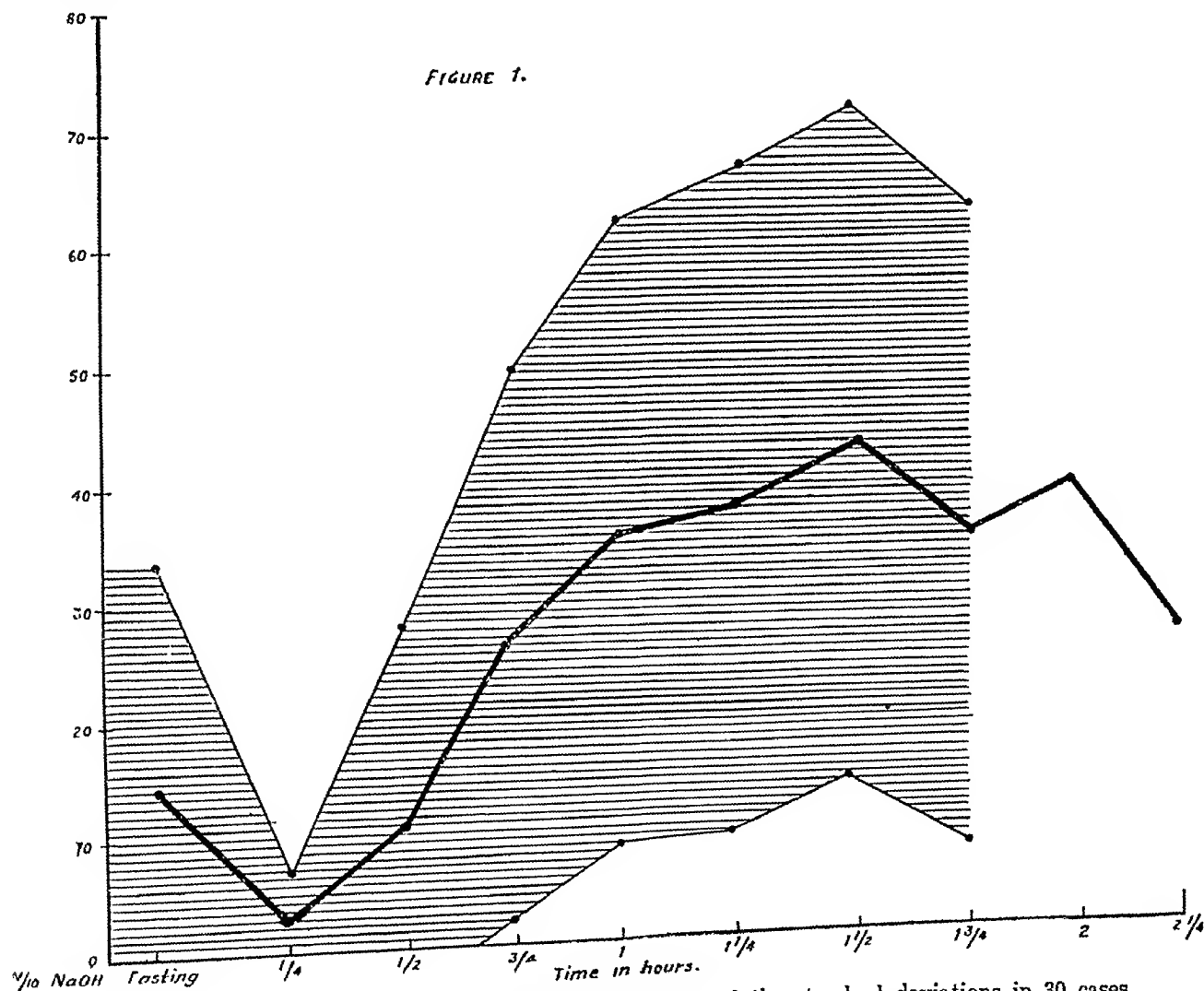


Fig. 1.—Free hydrochloric acid. The mean readings and the standard deviations in 30 cases.

only one case, there was normal acidity in 15 cases and hyper-acidity in 14 cases. This is shown in table IV and figure 1 gives the mean readings and the standard deviations of those findings.

It is possible that this hyperchlorhydria is due to reflex causes. In all the five cases with marked hyperchlorhydria the increase in the blood sugar after giving l  vulose was always above 30 mgm. per 100 c.cm. and the liver was

enlarged and tender to pressure in three out of the five cases.

TABLE V

Acidity	LÆVULOSE TOLERANCE TEST				
	Total number of cases	Rise below 30 mgm. (normal)	Rise below 30 mgm. but curve rising till the end of two hours.	Rise above 30 mgm. and curve rising	Number of cases in whom liver enlarged and tender to pressure
Hypo-acidity	1	..	1	..	..
Normal acidity	15	6	3	6	6
Hyper-acidity	14	3	2	9	8
TOTAL NUMBER OF CASES	30	9	6	15	14

Liver function.—Voegtlin and Bernheim (1911) demonstrated that in experimental anaphylaxis in animals the liver was essential for the development of anaphylactic shock. Weil (1917) showed that the isolated liver of a sensitized dog did not alter the coagulability of the blood with which it was perfused, but if the antigenic substance was added to the blood before it traversed the organ, it passed out with its coagulability either diminished or completely abolished. From this and from the fact that in dogs dying of anaphylactic shock the liver is practically the only organ showing pronounced and gross alteration he concluded that anaphylactic shock in dogs results from the reaction of the sensitized liver to the antigen substance.

Weil and Eggleston (1917) showed that the sensitized liver of the dog when perfused by the antigen mixed with defibrinated blood became intensely swollen and congested. The normal liver presented no change when thus prepared. Manwaring (1910) defined the anaphylactic reaction in dogs as an explosive formation or liberation of vasodilator substances by the hepatic parenchyma. The later work of Manwaring and his co-workers has definitely proved that in dogs sensitization to an antigen is confined almost entirely to the liver cells. Manwaring (1921) found that complete exclusion of the liver prevented the anaphylactic reaction in sensitized dogs. On releasing the ligatures and allowing the blood once more to pass through the liver, a prompt typical anaphylactic fall in blood pressure was produced. Manwaring, Hoespian, Enright and Porter (1925) showed that the typical anaphylactic contractions of the uterus, urinary bladder and intestine which take place during the first two minutes of anaphylactic shock in dogs do not take place on intravenous injections of foreign proteins into dehepatised anaphylactic dogs. They therefore concluded that these smooth muscle contractions are caused by chemical products (hepatic anaphylactoxin) explosively formed or liberated by the anaphylactic liver products and having a histamine-like effect on smooth muscle structures.

Manwaring, Hoespian, O'Neill and Moy (1925) produced additional evidence to prove the existence of hepatic anaphylactoxin by cross-circulation, hepatic transplantation and blood transfusion tests. They showed that if the liver of an anaphylactic dog be transplanted into a normal dog, the normal dog will

show all of the characteristic features of canine anaphylaxis. Manwaring, Reeves, Moy, Schumaker and Wright (1927) have shown by transplantation experiments that smooth muscle structures can be actively immunized against the anaphylactoxin. They, therefore, regard the anaphylactoxin as a secondary antigen, presumably of protein nature and conceivably a denaturation product of primary antigen.

The work of Weil and Manwaring and his co-workers has conclusively shown that the liver was the primary site of anaphylactic shock in dogs. Since their work it has been held that the liver in some way plays an important part in the production of allergic conditions in human beings. Dean (1922) in a case of anaphylactic shock in man found that the chief and essential change was in the liver. The naked-eye and microscopical appearances were very similar to those described by Weil in acute anaphylactic death in dogs. Oriel and Barber (1930) produced evidence of hepatic damage as revealed by the clinical investigation of the blood and urine in both acute and chronic allergic states in human beings. The results of liver-function tests done by Bray (1931) also point to hepatic inefficiency in asthma and other allergic conditions. Dale (1929), while agreeing with Lewis' view that the response in anaphylaxis was due to release of Lewis' H-substance by the anaphylactic injury of sensitized cells, suggests that anaphylactic injury of the cells of an organ like the liver might liberate histamine into the general circulation in sufficient quantity to cause a reaction of the cells in the other tissues not themselves sensitive to the antigen. Dale, further, holds that liberation of histamine alone will not account for all the symptoms and disturbances that occur in anaphylactic shock and allergic states; for example, the diminished coagulability of the blood, which is constantly found during the anaphylactic reactions in all animals, is not produced by histamine, but as a result of hepatic damage by various toxic substances. Dale points out that this fact alone suffices to show that constituents of the liver cells other than histamine are liberated.

Osman (1929) considers that in allergic children the underlying defect is a too-rapid depletion of the glycogen reserves of the liver. According to Cramer, glycogen in the liver is a secretion and it is not secreted in adequate amounts when the liver is damaged. The proteopexic function of the liver, i.e., its power of fixing foreign protein and its derivatives, appears to depend on an adequate supply of glycogen. When this is inadequate the foreign protein tends to pass the barrier of the liver and enter the general circulation. In this connection it is interesting to note that O'Neill, Moy and Manwaring (1925) found that glycogen disappears almost quantitatively from the canine liver during the first fifteen minutes of anaphylactic shock and McGuigan and Ross (1915) observed a reduction of liver glycogen during peptone poisoning.

There are a number of tests in vogue to test the functional efficiency of liver, but there is no single test that will indicate the state of the functional activity of the organ as a whole, because the liver has multifarious functions to perform; for example it is concerned with metabolism of carbohydrates and fats, with excretion of bile and with regulating the composition of the blood and it exerts a detoxicating effect. The test for any one function, as Sir Humphrey Rolleston (1931) points out, though giving that particular information, cannot therefore be expected to throw light on the other functional activities of the organ. Another difficulty in interpreting the results of hepatic function tests is the great reserve and regenerating powers

that the liver possesses. Mann (Dodds, 1931) produced a permanent reduction of 70 per cent of the functioning liver in dogs and was unable to detect any evidence of diminished function in these animals. Sir Humphrey remarks that after damage to the liver, for example in subacute atrophy, compensatory regeneration rapidly takes place and the functional efficiency of the organ is more or less restored.

The results of a number of tests taken together might give some information about the functional efficiency of the liver, with this view we carried out the following tests in the patients investigated, the icterus index and van den Bergh test, the lævulose tolerance test, the adrenalin test, and the test for urobilin in urine.

Icterus index.—This test gives the amount of bile pigment in the serum. A high icterus index denotes the inability of the liver to excrete the bile pigment wholly or in part, and is due either to damage to the liver or to increased blood destruction, or to both. The index will also be high if the patient is taking carrots, as carotin—the colouring matter in carrots—gives a deep colour to the serum. The icterus index test was first described by Bernheim (1924).

Technique.—About 5 c.c. of blood is withdrawn from a vein, is allowed to stand till the clot begins to separate and is then centrifugalized. The clear serum is removed with a pipette and compared in a colorimeter with a 1 in 10,000 solution of potassium bichromate. The cup containing the standard is kept at a fixed level say 15 or 20 and the one containing the serum is moved up and down till it matches the standard. The reading of the standard divided by the reading of the serum gives the icterus index. If the colour of the serum is too deep, it is necessary to dilute it with normal saline and the result is multiplied by the number of dilutions.

Lævulose tolerance test.—This test was first introduced by Strauss in 1901 to test the absorption power of liver for carbohydrates. He gave 100 grammes of lævulose by mouth and collected the urine for the following 24 hours; the appearance of sugar in the urine was considered as a sign of defective liver function. This did not give very satisfactory results and Shirokauer substituted the estimation of blood sugar in place of urinary sugar. In a normal person there should be little or no rise in blood sugar one hour after taking lævulose by mouth. Spence and Brett (1921) take a rise of 20 mgm. in blood sugar after ingestion of 50 grammes lævulose as a proof of liver inefficiency. Tallerman (1923) considers that if the actual rise in value from the original level exceeds 30 mgm. a degree of liver inadequacy should be presumed. The prolongation of the curve, i.e., a high blood-sugar value persisting at the end of 1½ to 2 hours, is strong evidence of such inadequacy. According to Elmer and Scheps (1930) in normal persons the maximum rise of blood sugar above fasting had never exceeded 20 mgm.

We have been giving a uniform dose of 100 mgm. lævulose to our cases (all adults). The patient gets nothing in the morning, the blood from a vein is taken to determine the fasting blood-sugar level and he is given lævulose dissolved in water to drink. Blood is again taken at the end of 1 and 2 hours.

The adrenalin liver-function test.—A subcutaneous injection of adrenalin normally raises the blood sugar, but fails to do so after hepatectomy, and has relatively little effect when the hepatic glycogen stores are exhausted, for example in starvation, showing that the rise in the blood sugar after the adrenalin injection is due to its action on the glycogen of the liver. In normal persons, after a subcutaneous injection of 0.5 c.cm. of a one-in-a-thousand solution of adrenalin chloride, the average rise in blood sugar is 30 to 40 mgm. above the fasting level. In liver dysfunction there is a very slight rise. A sample of blood is taken in the morning before the patient takes anything, adrenalin is then injected, and samples of blood removed ½ and 1½ hours afterwards.

Urobilin excretion in urine.—McMaster and Elman (1925) and Elman and McMaster (1925) proved experimentally that the formation of urobilin and its presence in faeces and bile directly depend upon the entrance of bile into the intestine. If the bile is not allowed to enter the intestine, disease of, or damage to, the liver cells will not lead to the presence of urobilin in the urine. Bilirubin on entering the intestine is changed by means of bacterial decomposition into urobilogen. The urobilogen thus formed in the intestine is eliminated, mostly with the faeces, as stercobilin. Some of it is absorbed and carried to the liver, to be taken out of the circulation again by the liver cells and to be secreted partly into the bile. The liver cells, when damaged, lose the power of dealing with the urobilogen that is absorbed from the intestine, this unchanged urobilogen is excreted in the urine giving rise to urobilinuria. So that diseased liver cells give rise to urobilinuria, not by making urobilogen but by failing to eliminate the urobilogen formed in the intestine and absorbed therefrom. Urobilinuria occurs with a far less degree of liver injury than does bilirubinuria, so that in liver diseases urobilinuria precedes bilirubinuria. Wallace and Diamond (1925) point out that the degree of interference with the liver function is dependent on the extent and rapidity of the disease process. So that in chronic liver affections, in contrast to the acute states, increase in urobilogen is not found as a constant factor; in slowly progressive liver affection there appears to occur a gradual adaptation of the liver substance to carry on its functions. They, therefore, think that in the chronic stage of biliary diseases neither the urobilogen in the urine nor the bilirubin in the serum show any deviation from the normal in the majority of instances, these tests being significant only in acute cases. Sir Humphrey Rolleston (1931) expresses the same opinion about all the liver-function tests, he says that it is in the acute rather than in the chronic disease of the liver that functional tests are likely to give constant evidence of impaired activity.

Increased blood destruction in the body is another condition that gives rise to urobilinuria. In cases of hæmolytic diseases, Elman and McMaster think that liver damage may be partly responsible for the urobilinuria, but the determining factor is the presence in the intestine of an unusually large amount of bile pigment. Urobilinuria during increased blood destruction is thus a secondary manifestation of increased bile formation due to liberation of increased amounts of hæmoglobin. A large amount of bilirubin enters the intestine and gives rise to the formation of a large amount of urobilogen, which is absorbed in too large a quantity to be adequately dealt with by the liver. The result is that the urobilogen which has not been dealt with by the liver escapes into the general circulation and is excreted by the kidney into the urine.

In the case of complete obstruction of the bile duct no bilirubin will enter the intestine and consequently no urobilogen will be formed. So that in persons with complete obstruction of the bile duct there will be

no urobilinuria even with severe damage to the liver cells or a severe blood destruction or both.

The clinical observation of jaundice would be the most convincing evidence of liver dysfunction, but this is not often present. In our series of 40 cases jaundice was present only in one case. In this case the icterus index was 11, van den Bergh test was negative, the liver was enlarged and tender, the l  vulose tolerance and adrenalin tests showed defective liver function and urobilin was present in the urine.

The icterus index.—This was determined in 30 cases; in 25 cases it was below 6 and only in 5 cases above 6. In all the cases in which the index was above 6 the l  vulose tolerance test showed defective liver function. The indirect van den Bergh test was positive in 3 out of the 5 cases with an icterus index above 6.

The van den Bergh test.—The direct van den Bergh was not positive in any case. The indirect test was positive in 9 cases. In 5 out of the 9 cases the l  vulose tolerance test showed defective liver function, while the adrenalin test indicated deficient function in only 2.

Adrenalin test.—This was done in 38 cases. In 23 cases the rise in blood-sugar level was below 30 mgm., varying from 0 to 29 mgm., the average rise in these cases being less than 15 mgm. per 100 c.cm. of blood. In 15 cases the rise was 30 or more mgm., varying from 30 to 53, the average rise being about 40 mgm. per 100 c.cm. of blood. So that the adrenalin test showed defective glycogenic function in 23 out of the 38 cases tested.

Bray (1931) did the test in 55 asthmatic children and found evidence of liver dysfunction in 23 cases. The relation between the results obtained by the adrenalin test and those by the l  vulose tolerance test are shown in table VI. It will be seen that amongst the 23 cases in which the adrenalin test indicates liver dysfunction, there are 17 cases in which the l  vulose test also indicates liver dysfunction.

TABLE VI

Adrenalin test	Number of cases	L��VULOSE TOLERANCE TEST	
		Defective	Normal
Adrenalin test indicates defective liver function.	23	17	6
Adrenalin test indicates normal liver function.	15	11	4

L  vulose tolerance test.—This was done in 38 cases. The results were normal in 10 cases, the rise in blood-sugar level being below 30 mgm. and the blood-sugar value returning to normal at the end of 2 hours. The average rise in these cases was 14.4 mgm. per 100 c.cm.

In 28 cases the test indicates liver deficiency, in 20 cases the rise was above 30 mgm. and was maintained till the end of 2 hours, the average rise being 43 mgm., in 8 cases the rise was below 30 mgm. but still it was maintained till the end of 2 hours, the average rise in these cases being 16 mgm. per 100 c.cm. These results are shown in figures 2, 3 and 4. So that in

mgm of sugar
per 100 c.c. of blood.

FIGURE 2.

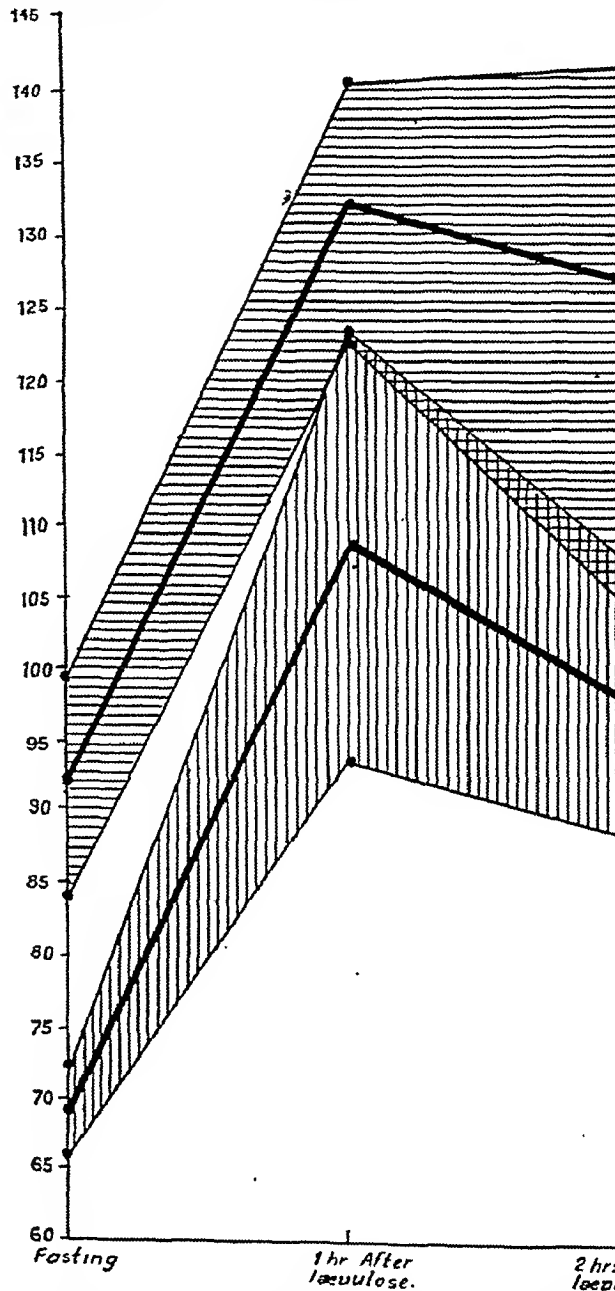


Fig. 2.—The mean readings and the standard deviations in the 20 cases showing a rise in the blood sugar of 30 mgm. or more. The cases have been divided into two groups, 8 in which the initial blood sugar was 80 mgm. or over, and 12 in which it was 75 mgm. or less. There were 6 bronchial cases in the first group and 9 in the second.

34 out of the 38 cases investigated liver dysfunction was shown either by the lævulose test or the adrenalin test or by both.

Clinical observations.—Enlargement and tenderness of the liver was present in 15 of the 40 cases. In 13 out of these 15 cases,

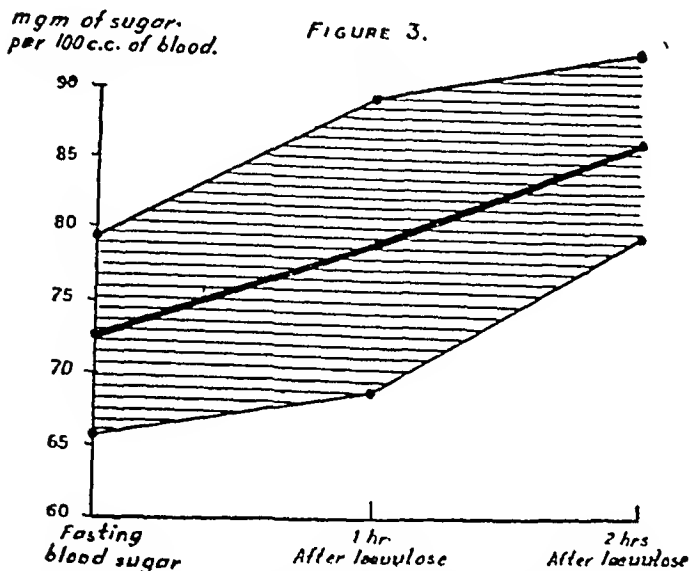


Fig. 3.—The mean readings and the standard deviations in 8 cases in whom the rise in blood sugar was below 30 mgm. but the curve was a rising one till the end of two hours.

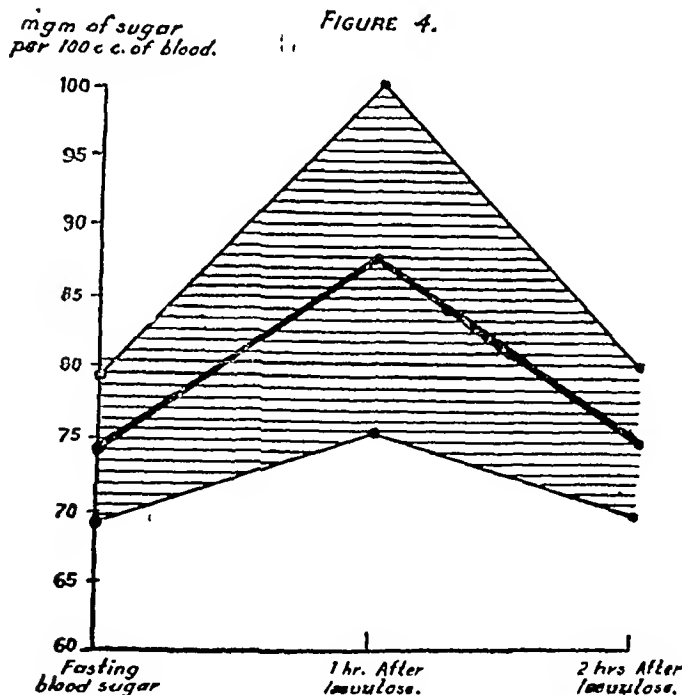


Fig. 4.—The mean readings and the standard deviations in 10 cases in whom the lævulose tolerance test was normal. The rise was below 30 mgm. and the initial level was restored at the end of two hours.

other evidence of liver dysfunction was present; in 7 cases both the lævulose and the adrenalin test, in 3 cases only the lævulose test, and in the remaining 15 only the adrenalin test suggested defective function. Thus there was no correlation between the results of the adrenalin and lævulose tests and liver enlargement.

Of the 9 positive van den Bergh tests 5 were in these 15 cases with liver enlargement and 4 were in the remaining 25 cases. Similarly these 15 cases of liver enlargement included 3 cases with an icterus index above 6, in the remaining 25 cases the icterus index was above 6 in only 2 cases. So that it is possible that there is some correlation between enlargement of the liver and a positive van den Bergh test and a high icterus index.

Urobilin in the urine.—Urobilin was present in 19 cases; amongst these 10 showed defective lævulose and adrenalin tests, 2 defective lævulose test and 5 defective adrenalin test; in the remaining 2 cases there was no evidence of liver dysfunction other than urobilinuria.

The results with the five tests for liver dysfunction show that the lævulose tolerance test gives evidence of liver dysfunction in the highest number of cases, then comes the adrenalin test, and the finding of urobilin in the urine (lævulose tolerance in 28 out of 38 cases, adrenalin test in 23 out of 38 cases and urobilinuria in 19 of the 40 cases), whereas the icterus index and the van den Bergh test give positive results in very few cases.

Although the lævulose tolerance test gave evidence of liver dysfunction in a greater number of cases than many other tests yet in many cases where a positive result was expected we got negative results. For instance of all the cases we expected evidence of liver dysfunction in those who had *Entamæba histolytica* or hookworm infection in their gut, but these were the cases where such evidence was obtained in the least number of cases. Amongst 8 such cases the lævulose test was abnormal only in 3, as will be seen from table VII.

It is possible and probable that in some of these cases liver dysfunction was present but was not detected by the lævulose test. Radhakrishna Rao (1933) reports some cases with definite clinical evidence of liver disease giving negative results with the lævulose tolerance test.

A perusal of table VII shows that the ages in all the three patients with *histolytica* or hookworm infection showing an abnormal lævulose test was 35 years and above.

While in the other 5 cases where *histolytica* or hookworm infection was not associated with an abnormal lævulose test the age was above 35 years only in one case, being between 22 and 30 in the other 4. In other words in the 4 patients above 35 years the lævulose test was abnormal in 3 while in the other 4 between 22 and 30 years it was not abnormal in a single case. The same correlation between the abnormal lævulose test and the age incidence is apparent when all the 38 cases in which the lævulose test was done are taken into consideration. Amongst the 28 patients showing a defective lævulose test the ages were above 30 years in 20 cases and below 30 in 8 cases.

TABLE VII

Number	Stool findings	Age	Lævulose tolerance	Liver
1	<i>Entamæba histolytica</i> , <i>Entamæba coli</i> and <i>Giardia</i> cysts.	35	Defective	Enlarged and tender.
2	Hookworm	39	Do.	Do.
3	Do.	42	Do.	Do.
4	Do.	36	Normal	....
5	Do.	30	Do.	....
6	Hookworm and <i>Entamæba histolytica</i> cysts.	24	Do.	....
7	<i>Entamæba histolytica</i> , vegetative and cysts.	26	Do.	Palpable.
8	Hookworm	22	Do.	Palpable and tender.

While amongst the 10 patients showing normal lævulose test the age was above 30 in 5 cases and below 30 in the other 5.

This suggests that there is an increase in the incidence of an abnormal lævulose test with increase in age. This correlation is also evident when we compare our results with those of Bray. Bray (1931) in 55 children got an abnormal lævulose test in 23, i.e., in about 42 per cent of his cases. While in our series of 38 cases an abnormal test was obtained in 28, i.e., in about 74 per cent. It may be that in the younger age the margin of safety in the liver is much more than in adults, so that a greater amount of hepatic damage or dysfunction is required in these cases than in the adults, to give an abnormal lævulose test.

We have not investigated enough cases to be able to say whether or not the gut cases show a greater amount of liver dysfunction than the bronchial cases, but it is clear that in a large percentage of the cases of bronchial asthma evidences of liver dysfunction and intestinal stasis can be obtained.

What part do liver dysfunction and intestinal stasis play in bronchial cases, i.e., the cases secondary to some infection or disease of the respiratory passages?

McDowall (1930) has shown that the introduction of some foreign protein into some animals causes a greatly increased sensitivity of the vagus. In such animals response to an injection of pilocarpine is enormously enhanced and a dose which normally would have little effect may almost kill the animal. Stolar Sherwood and Woodbury (Bray, 1931) found that the excitability of the vagus was increased by previous injections of foreign sera. Freud and Gottlieb (Bray, 1931) found that the peptone or foreign serum caused an enormous increase in the salivary response to pilocarpine.

Eppinger and Hess (McDowall, 1930) showed that asthmatics were unduly sensitive to pilocarpine—the

drug by which the stimulation of the vagus can most conveniently be brought about. The work of Walzer and Schloss has shown the possibilities of enteral absorption of unaltered food proteins.

Pickering (McDowall, 1930) has shown that inadequately digested protein might enter the blood in such quantities as to effect coagulation of blood. Eustis (Bray, 1931) collected 121 cases of spasmodic bronchial asthma associated with intestinal toxæmia and suggests that toxic amines formed by intestinal putrefaction are split up by normal individuals and that asthmatics have lost that power.

It is possible that foreign proteins absorbed from the intestine and entering the general circulation, on account of inadequate proteopexic function of the liver, enhance the sensitivity of the vagus, so that stimuli which would be without effect in normal people cause bronchial spasm. The proteins may be absorbed not only from the intestines but also from the respiratory tract itself or bacterial proteins from any focus of infection in the body may gain access to the general circulation.

Apart from the action on the sensitivity of the vagus nerve, foreign protein in common with the toxins absorbed from the gut has a locally constricting effect on the bronchial musculature. The patients in whom the attack of asthma is due to direct chemical action of the substances absorbed from the gut on the bronchial musculature will be relieved by an injection of adrenalin; we have classed these as cases of gut origin. The patients in whom the attacks are due to bronchial constriction brought about by direct or reflex stimulation of the vagus (whose activity has been heightened by protein absorption) will derive benefit from a subcutaneous injection of atropine. Atropine will have no effect in cases in which there is direct action on the bronchial musculature.

Summary and conclusions

(1) Results of the biochemical investigation in 40 cases of asthma are reported.

(2) Pande's adrenalin test for sympathetico-tonia gave no useful information. The reaction was normal in all the cases.

(3) The blood sugar and the systolic blood pressure was generally low and this seems to be due to hypo-adrenia.

(4) The ether reaction for proteoses was done in 40 cases with positive results in 36. Dermal tests with auto-proteoses and with proteoses separated from other patients were tried in 9 cases with negative results.

(5) Indican was present in the urine of 37 of the 40 cases and enterococci in abundance were present in cultures from the stool in 20 cases. These findings point to the presence of intestinal stasis. The important part which the intestinal stasis plays in bringing about the symptoms has been discussed.

(6) Fractional gastric analysis was done in 30 cases. Hypo-acidity was present in only one case, there was normal acidity in 15 cases and hyper-acidity in 14 cases.

parasites per c.mm. always proved fatal in spite of prompt treatment. In the earlier experiments a course of 3 injections of tebetren in doses of $4\frac{1}{2}$ to 6 grains daily was given by the intramuscular route, but in subsequent experiments injections were given for 4 days. In the intravenous series doses larger than 3 grains for a monkey of average weight (3 to 5 kilogrammes) proved fatal in a number of animals; doses of 3 grains were therefore given in the later experiments.

In the following tables the detailed observations of the effect of tebetren on these animals are recorded :

TABLES

No. I, *Silenus rhesus*, weight 4.540 kilogrammes, inoculated with 0.5 c.cm. blood from a heavily parasitized monkey (count not done) containing rings, trophozoites and schizonts. Incubation period 7 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
2-5-34 3-5-34	Rings 450,000	3 grains i.m.	Rings, growing trophozoites and schizonts. R.B.C. 6,200,000 per c.mm.
4-5-34	466,200	Do.	Trophozoites and schizonts. R.B.C. 5,180,000 per c.mm.
5-5-34	325,000	Do.	Parasites chiefly growing trophozoites. Infected cells showing Schüffner's dots. R.B.C. 5,000,000 per c.mm.
7-5-34	Scanty trophozoites.	Do.	Parasites showing evidence of degeneration. R.B.C. 4,320,000
8-5-34	Scanty	Do.	Degenerating parasites.
9-5-34	Very scanty	Do.	Degenerating parasites. Marked basophilia. R.B.C. 3,800,000 per c.mm.
10-5-34	No parasites.	..	Marked basophilia Normoblasts. R.B.C. 3,800,000 per c.mm.
14-6-34	Parasites (no count).	..	Rings, growing trophozoites and schizonts.
15-6-34	180,000	6 grains i.m.	Rings, growing trophozoites and schizonts. R.B.C. 3,000,000 per c.mm.
16-6-34	90,000	Do.	Normoblasts R.B.C. 1,520,000 per c.mm.
17-6-34	15,000	Do.	Evidence of degeneration in the parasites.
18-6-34	No parasites.	Do.	Basophilia, normoblasts.

Tebetren was given by the intramuscular route in doses of 3 grains daily for 6 days. A low grade of infection persisted for about a month after the cessation of treatment of the primary infection. On 15th June, 1934, there was a relapse with a parasite count of 180,000 per c.mm.; a larger dosage, 6 grains daily for 3 days, completely controlled the infection. No parasites were found in the peripheral blood during an observation period of 5 months.

No. II, *Silenus rhesus*, weight 3.460 kilogrammes, inoculated with 1 c.cm. of heavily parasitized blood. Incubation period 8 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
25-5-34	140,000	6 grains i.m.	Rings and trophozoites. R.B.C. 4,600,000 per c.mm.
26-5-34	80,000	Do.	R.B.C. 4,000,000 per c.mm.
28-5-34	?	Do.	Evidence of degenerative changes in the parasites.
29-5-34 to 26-7-34	No parasites.	..	....

Two tablets of tebetren daily intramuscularly for 3 days completely controlled the infection. Degenerative changes of the parasites were marked after the second injection and they disappeared after the third injection. No parasites could be detected in the peripheral blood afterwards for an observation period of nearly 2 months. The monkey died on the night of 26th July, 1934, probably as a result of some intercurrent infection. Smear from heart's blood showed no parasites.

No. III, *Silenus rhesus*, weight 3.510 kilogrammes, inoculated with 0.5 c.cm. blood containing 275,000,000 parasites. Incubation period 4 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
11-6-34	100,000	..	Rings and growing trophozoites
12-6-34	1,000,000	6 grains i.m.	Rings, trophozoites and schizonts.
13-6-34	425,700	Do.	Do.
14-6-34	23,350	Do.	Degenerating parasites. R.B.C. 4,670,000 per c.mm.

Treatment was started in this case when the parasite count was very high, i.e., 1,000,000 parasites per c.mm. The parasites were nearly halved 24 hours after the first injection and completely disappeared from the peripheral blood after a course of 3 injections (6 grains daily for 3 days). A relapse occurred 12 days after this like that observed in cases treated with atebren, and proved fatal. A smear from heart's blood showed that almost every red cell was infected, many showing multiple infection. This is the only animal in our series of experiments in which a relapse proved fatal.

No. IV, *Silenus rhesus*, weight 3.695 kilogrammes, inoculated with 1 c.cm. blood containing 405,900,000 parasites. Incubation period 5 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
26-6-34	778,000	6 grains i.m.	Parasites mostly rings. R.B.C. 5,190,000 per c.mm.
27-6-34	625,500	Do.	All forms of parasites, rings, trophozoites, schizonts and gametocytes. R.B.C. 4,270,000 per c.mm.
28-6-34	Scanty	Do.	Evidence of degenerative changes in the parasites. R.B.C. 4,190,000 per c.mm.
29-6-34	No parasites.	..	Commencing basophilia. Demilune cells.
9-7-34	Scanty	..	Rings.
12-7-34	357,000	6 grains i.m.	Mostly rings. Few growing trophozoites. R.B.C. 5,100,000 per c.mm.
13-7-34	414,000	Do.	Mostly growing trophozoites, few rings. Evidence of degeneration in the parasites. Commencing basophilia. R.B.C. 4,600,000
14-7-34	67,500	Do.	Degenerative changes in the parasites.
16-7-34	No parasites.	Do.	Basophilia, normoblasts.

This animal received a course of 3 injections (6 grains daily) when the parasite count was fairly high. A relapse occurred in ten days, all stages of parasites being found in the peripheral blood. A longer course of 4 injections was given (6 grains daily); the parasites disappeared and were not found again in the peripheral blood during an observation period of 4 months.

No. V, *Silenus rhesus*, weight 3.720 kilogrammes, inoculated with 0.5 c.cm. blood containing 173,100,000 parasites. Incubation period 5 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
3-7-34	130,000	..	Parasites mostly rings.
4-7-34	700,000	6 grains i.m.	Rings and growing trophozoites. R.B.C. 5,000,000 per c.mm.
5-7-34	1,009,800	Do.	Mostly growing trophozoites and schizonts. R.B.C. 4,590,000 per c.mm.
6-7-34	80,000	Do.	Parasites showing degenerative changes.
7-7-34	No parasites.	Do.	Commencing basophilia, normoblasts.

Treatment was started when the parasite count was fairly high, i.e., 700,000 parasites per c.mm. A course of 4 injections (6 grains daily) was given from the beginning instead of three as in the previous experiments. In this case the first injection had no effect on the parasites and the count rose above 1 million on the second day; it came down subsequently and the parasites disappeared after 3 injections. Degenerative changes in the parasites were well marked after 2 doses. This animal was under observation for more than 4 months after the cessation of treatment, and frequent examinations of the blood did not show any parasites. In this respect the action of tebetren resembled that of quinine.

No. VI, *Silenus rhesus*, weight 5 kilogrammes, inoculated with 1 c.cm. blood containing 700,000,000 parasites. Incubation period 5 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
11-7-34	931,000	6 grains i.m.	Rings and growing trophozoites. R.B.C. 4,900,000 per c.mm.
12-7-34	491,000	Do.	All forms of parasites including gametocytes. R.B.C. 4,910,000 per c.mm.
13-7-34	Scanty	Do.	Evidence of degenerative changes in the parasites.
14-7-34	Do.	Do.	Do.
15-7-34 to 15-11-34	No parasites.	..	....

This monkey was given a course of 4 injections, 6 grains daily. After 2 injections the parasites showed degenerative changes, their number being considerably reduced; scanty degenerating forms were found for the next two days. Subsequently the peripheral blood remained free of parasites (similar to monkeys II and V).

No. VII, *Silenus rhesus*, weight 4.560 kilogrammes, inoculated with 0.5 c.cm. blood containing 221,200,000 parasites. Incubation period 5 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
20-8-34	260,000	..	Rings and growing trophozoites.
21-8-34	688,500	6 grains i.m.	All forms of parasites. R.B.C. 5,100,000 per c.mm.
22-8-34	1,260,000	Do.	All forms of parasites, apparently healthy. R.B.C. 4,500,000 per c.mm.

This monkey was given the drug intramuscularly when the parasite count was fairly high. The count rose to above 1 million in spite of treatment (1,260,000 parasites per c.mm.), a condition hardly compatible with life.

No. VIII, *Silenus rhesus*, weight 3 kilogrammes, inoculated with 0.5 c.cm. blood containing 344,250,000 parasites. Incubation period 5 days.

In this monkey treatment was started on 27th August, 1934, when the parasite count was above 1 million (1,200,000 parasites per c.mm.) in order to see whether the drug had any effect in such a heavy infection; $4\frac{1}{2}$ grains of tebetren was given intramuscularly. The monkey died on the same night. Smears from liver and heart's blood showed that these organs were crammed with parasites, nearly 80 per cent of the red cells being infected.

No. IX, *Silenus rhesus*, weighing 3.100 kilogrammes, was inoculated with 0.25 c.cm. blood containing 300,000,000 parasites. Incubation period 5 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
3-9-34	561,000	3 grains i.m.	Rings and growing trophozoites R.B.C. 5,100,000 per c.mm.
4-9-34	133,500	Do.	All stages of parasites. R.B.C. 4,450,000 per c.mm.
5-9-34	Scanty	Do.	Evidence of degenerative changes in the parasites.
6-9-34	Do.	Do.	Evidence of degenerative changes in the parasites. Basophilia, normoblasts.

This animal received a course of 4 injections (3 grains daily). Very scanty parasites however persisted in the blood for a week after cessation of treatment; on the eighth day the count again rose to 120,000 parasites per c.mm. The multiplication of parasites was however less rapid and the count gradually came down without further treatment. Subsequent to this the peripheral blood remained mostly free of parasites.

No. X, *Silenus rhesus*, weight 4.730 kilogrammes, inoculated with 0.5 c.cm. blood containing 70,000,000 parasites. Incubation period 7 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
2-6-34	300,000	$4\frac{1}{2}$ grains i.v.	Rings and growing trophozoites R.B.C. 5,010,000 per c.mm.
3-6-34	160,000	Do.	R.B.C. 4,100,000 per c.mm.
4-6-34	Scanty	Do.	Degenerating parasites.
5-6-34	Do.	..	....
6-6-34	Do.	..	....
8-6-34	Parasites ++ (count not done).	..	....
9-6-34	219,000	$4\frac{1}{2}$ grains i.v.	....
11-6-34	22,500	Do.	Few rings, mostly trophozoites.
12-6-34	Scanty	Do.	Degenerating parasites.

In this animal the infection was controlled with doses of $4\frac{1}{2}$ grains daily for 3 days intravenously. Though the primary infection was controlled with this course of treatment, it was not sufficient to prevent the rapid multiplication of parasites within a very

short time (4 days). The parasites again appeared in the peripheral blood 12 days after the second course of tebetren, but this time they multiplied less rapidly and gradually disappeared even without treatment. This animal was under observation for a period of over 4 months after the cessation of treatment, and the peripheral blood remained free of parasites during the period.

No. XI, *Silenus rhesus*, weight 3 kilogrammes, inoculated with 0.5 c.cm. blood containing 150,000,000 parasites. Incubation period 3 days.

This monkey died within five minutes of an intravenous injection of $4\frac{1}{2}$ grains of tebetren. As this dose was toxic, the dosage by the intravenous route was reduced in the subsequent experiments.

No. XII, *Silenus rhesus*, weight 3.880 kilogrammes, inoculated with 1 c.cm. blood containing 1,000,000,000 parasites. Incubation period 7 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
20-6-34	405,900	3 grains i.v.	Rings and growing trophozoites. R.B.C. 4,510,000 per c.mm.
21-6-34	500,800	$4\frac{1}{2}$ grains i.v.	Rings and growing trophozoites R.B.C. 4,590,000 per c.mm.
22-6-34	480,000	Do.	All forms of parasites including gametocytes. Evidence of degenerative changes. R.B.C. 4,000,000 per c.mm.
23-6-34	40,000	Do.	Degenerating parasites.
24-6-34	Scanty parasites.	..	....
25-6-34	No parasites.	..	....
1-7-34	155,200	$4\frac{1}{2}$ grains i.v.	Rings and trophozoites.
2-7-34	83,750	Do.	Parasites appear to be healthy.
3-7-34	Scanty	$4\frac{1}{2}$ grains i.m.	The injection was given intramuscularly because of the difficulty of finding a suitable vein after repeated i.v. injections.
4-7-34	No parasites.	6 grains i.m.	Basophilia, poikilocytosis, normoblasts, etc.
19-7-34	Rings ++	..	....
20-7-34	118,800	6 grains i.m.	Mostly growing trophozoites, a few schizonts. R.B.C. 4,000,000 per c.mm.
21-7-34	68,200	Do.	Evidence of degeneration. R.B.C. 3,410,000 per c.mm.
22-7-34	No parasites.	Do.	Basophilia, normoblasts.
23-7-34	Do.	Do.	Do.

This animal was given a course of 4 injections intravenously. The parasites disappeared after the

fourth injection (usually after 2 injections by the intramuscular route). A relapse or recrudescence occurred 5 days after the treatment of the primary infection and again a fortnight after the second course of tebetren, for which tebetren was given partly intravenously and partly by the intramuscular route. A low grade of infection persisted for about 2 months but the parasites never multiplied rapidly. Subsequent to this the peripheral blood showed no parasites.

No. XIII, *Silenus rhesus*, weight 3.610 kilogrammes, inoculated with 0.5 c.cm. blood containing 389,000,000 parasites. Incubation period 6 days.

This monkey received 4½ grains of tebetren intravenously. Immediately after the injection the animal had convulsions with spasmodic respiration and died within half an hour (see also monkeys XI and XIV).

No. XIV, *Silenus rhesus*, weight 4.290 kilogrammes, inoculated with 0.5 c.cm. blood containing 465,500,000 parasites. Incubation period 7 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
19-7-34	395,200	4½ grains i.v.	Mostly rings, few growing trophozoites.
20-7-34	125,000	Do.	R.B.C. 6,080,000 per c.mm. Rings and trophozoites. The animal had convulsions of the whole body immediately after the injection. Died after ten minutes.

It has already been shown that a dosage larger than 3 grains intravenously proves toxic for these animals. In this case though the parasite count came down appreciably after the first injection, the animal succumbed after the second dose.

No. XV, *Silenus rhesus*, weight 4.100 kilogrammes, inoculated with 0.5 c.cm. blood containing 197,600,000 parasites. Incubation period 7 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
27-7-34	..	..	Rings and growing trophozoites
28-7-34	276,000	3 grains i.v.	Rings and trophozoites. R.B.C. 6,140,000 per c.mm.
29-7-34	770,900	Do.	All forms of parasites including gametocytes. apparently healthy. R.B.C. 5,930,000 per c.mm.
30-7-34	58,500	Do.	Evidence of degenerative changes in the parasites. R.B.C. 4,000,000 per c.mm.
31-7-34	Scanty	Do.	Degenerating parasites. R.B.C. 3,800,000 per c.mm.
3-8-34	Do.	Do.	....

In this monkey the dose of tebetren by the intravenous route was reduced to 3 grains and was well tolerated. The parasite count came down appreciably after 3 injections, but a low grade of infection persisted for more than 6 months for which no treatment was necessary as the parasites never multiplied rapidly.

No. XVI, *Silenus rhesus*, weight 4.159 kilogrammes, inoculated with 0.5 c.cm. blood containing 138,000,000 parasites. Incubation period 6 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
4-8-34	102,000	3 grains i.v.	Mostly rings and growing trophozoites. R.B.C. 5,100,000 per c.mm.
5-8-34	162,000	Do.	All stages of parasites. R.B.C. 5,400,000 per c.mm.
6-8-34	42,000	Do.	Degenerating parasites. R.B.C. 4,200,000 per c.mm.
7-8-34	20,000	Do.	Degenerating parasites.
8-8-34	Scanty	..	Do.

In this animal the infection was controlled after the fourth injection of tebetren intravenously. Rapid multiplication of the parasites occurred from the fifth day after cessation of treatment of the primary infection which was controlled with 3 more intravenous doses (3 grains daily). Though a relapse occurred 18 days after this, the multiplication of the parasites was less rapid and they disappeared without any further treatment.

No. XVII, *Silenus rhesus*, weight 5.216 kilogrammes, inoculated with 0.5 c.cm. blood containing 51,000,000 parasites. Incubation period 7 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
13-8-34	Rings and trophozoites ++	..	....
14-8-34	442,400	3 grains i.v.	All stages of the parasites. R.B.C. 5,530,000 per c.mm.
15-8-34	90,000	Do.	All stages of the parasites. R.B.C. 4,500,000 per c.mm.
16-8-34	174,000	Do.	Parasites are apparently healthy. R.B.C. 4,350,000 per c.mm.
17-8-34	Scanty	Do.	Degenerating parasites.
18-8-34	Do.	..	....
21-8-34	..	..	..
23-8-34	280,000	..	Mostly rings. Normoblasts, basophilia. R.B.C. 3,500,000 per c.mm.

No. XVII, *Silenus rhesus*—concl'd.

Date	Parasite count per c.mm.	Treatment	REMARKS
24-8-34	96,000	..	Mostly rings and trophozoites. Basophilia, normoblasts and pigmented leucocytes. Some of the parasites are degenerating.
25-8-34	180,000	..	Do.
26-8-34	55,000	..	Do. R.B.C. 2,500,000 per c.mm.
27-8-34	150,000	..	....
28-8-34	75,000	..	....
29-8-34	37,500	..	....
30-8-34	10,000	..	....
1-9-34	Scanty	..	Degenerating parasites. Basophilia, normoblasts.

In this monkey the parasite count came down after 3 intravenous injections, scanty parasites however persisting. Five days after the cessation of treatment, the parasites multiplied rapidly and the count rose to 280,000 parasites per c.mm. No treatment was given for this; though the infection persisted for more than a month, the parasite count gradually came down. Later during an observation period of about 3 months, the peripheral blood remained mostly free of parasites (see also monkeys IX, X and XVI).

Discussion

A perusal of the foregoing tables will show that in monkeys I to IX tebetren was administered intramuscularly while in monkeys X to XVII it was given intravenously. The drug undoubtedly has a destructive effect on *Plasmodium knowlesi* infection in these animals whether it is given by the intramuscular or the intravenous route. Dosage of $4\frac{1}{2}$ to 6 grains daily for 2 to 3 days by the intramuscular route and 3 grains daily intravenously for 3 to 4 days controlled a heavy infection which amounted to as much as a million parasites per c.mm. In the majority of the animals its action was immediate; the parasites usually decreased in numbers after the first injection or, even when they did not decrease, their multiplication stopped or was considerably inhibited. In this respect the drug differed somewhat from quinine which, in our experiments described in a previous paper (1934), did not so promptly stop or inhibit the growth of the parasites after the first injection, but often appeared actually to accelerate their multiplication. This increase in the number of parasites in the peripheral blood was also observed after intravenous injection of quinine in man by Chopra and his co-workers (1932). It will also be observed that in some animals of this series, after a full course of treatment of the primary infection, the plasmodia disappeared from the peripheral blood entirely (nos. II, V and VI), while in

others they reappeared after an interval, producing a relapse (nos. I, III, IV, XII and XVI) and in no. III the relapse proved fatal in spite of treatment.

Dosage.—Monkeys weighing between 3 to 5 kilogrammes tolerated a dose of $4\frac{1}{2}$ to 6 grains dissolved in $1\frac{1}{2}$ to 2 c.cm. of distilled water by the intramuscular route without any untoward effects; no local reactions were observed. The number of injections necessary to free the peripheral blood from plasmodia varied from 3 to 4, and this was effective in controlling a heavy infection (nos. III, IV, V and VI). By the intravenous route a dose of 3 grains could be administered safely, but doses larger than this proved fatal and three animals died after injections of $4\frac{1}{2}$ grains of tebetren (nos. XI, XIII and XIV). Doses of 3 grains in animals weighing 4 to 5 kilos. appear to be safe and, when compared with the effective therapeutic dose of 24 to 36 grains (8 to 12 tablets a day) for an adult human being weighing 60 to 80 kilos., show that the toxicity of the drug is fairly low.

Intramuscular and intravenous injections.—A study of tables I to IX shows that after a single intramuscular injection of tebetren in most of the cases the plasmodia showed degenerative changes, were quickly destroyed and their number in the peripheral blood showed a considerable decrease. The reduction in the number of parasites appeared after the first injection but was definite and considerable after the second injection. In this respect the effect of tebetren would appear to approach that of atebren, which in our experiments reported in a previous paper (1933) produced a remarkable decrease in the number of parasites as well as marked degenerative changes in their cytoplasm almost immediately. Though the action of this drug was not so rapid as that of atebren, the results were fairly constant and a very heavy infection appeared also to be more amenable to treatment with tebetren than quinine. Intramuscular injections of quinine, it will be remembered, have a gradual action on the parasites and, as a rule, there is no remarkable decrease in their numbers for 24 hours after the first injection or even longer.

The state of affairs after intravenous injection of tebetren, however, was different. Whereas atebren produced similar effects on the parasites whether given by the intramuscular or the intravenous route, the effect of tebetren on the plasmodia when given intravenously was much less evident. The effects observed were variable and undoubtedly much weaker after the first injection; sometimes even after the second injection hardly any changes were noticed. As a matter of fact after the first injection in most of the animals (nos. XII, XV and XVI) there was an actual increase in the number of parasites in the peripheral blood, and as a rule 3 injections were necessary to

reduce appreciably the number of plasmodia. The parasite count increased on the second day in monkeys XV and XVI, decreased in monkey XVII but increased again on the third day; the count in no. XII remained more or less steady for 3 days while only in no. X it came down appreciably from the second day onward. This effect of tebetren may be due to rapid excretion of the drug when given intravenously so that the contact of the drug with the parasites is of shorter duration.

Comparative action of atebtrin, quinine and tebetren

It has already been stated that atebtrin has a powerful immediate effect on *Plasmodium knowlesi*. Even when the parasite count is high, one dose of this compound produces an enormous reduction in the number of the plasmodia and the infection is controlled by whatever route the drug is administered, intramuscular or intravenous. In the case of quinine one dose is only effective when the parasite count is low but in heavy infections two or more injections are necessary. Tebetren would appear to stand between quinine and atebtrin in its action on this plasmodium in so far as the reduction in the number of parasites is concerned. Generally the parasite count is nearly halved 24 hours after an intramuscular injection of atebtrin and degenerative changes are evident after the second injection. By the intravenous route the effects in case of tebetren are less conspicuous and two or three injections are necessary to bring down the parasite count, and in this respect it bears a closer resemblance to quinine.

So far as relapses are concerned, tebetren appears to possess an advantage over atebtrin. After five days' intensive treatment with atebtrin in fairly large doses, the plasmodia invariably reappeared in 10 to 15 days and multiplied with the same rapidity as in the primary attack causing death of the animal if prompt treatment was not given, whereas with tebetren though a relapse or recrudescence occurred in some animals in 5 to 12 days, it did not prove fatal except in no. III. In some of the relapses the animals were kept without treatment intentionally, and the parasites often disappeared spontaneously (nos. IX, X, XVI and XVII). In nos. II, V and VI the parasites disappeared altogether from the peripheral blood after an intensive treatment of the primary infection with this compound and in monkey XV the parasites were scanty, never multiplied and the animal remained healthy without further treatment.

Tebetren chemically is said to be a methylhydrocupreine-methyl-acridine - dihydrocholate, i.e., a compound in which quinine is combined with acridine from which atebtrin is derived. The destructive action of tebetren on *P. knowlesi* infection appears to combine

the virtues of quinine and atebtrin. So far as the control of infection is concerned, it has a powerful and rapid destructive action on the plasmodia, thus resembling atebtrin; reduction in the number of the parasites in the peripheral blood is more rapid than with quinine. With regard to relapses the effects on these animals were very much like those produced in quinine-treated animals inasmuch as the parasites either disappeared spontaneously after a relapse or if they multiplied the multiplication was not so intensive as to cause death of the animal except in one instance. The action of tebetren in human malaria is under investigation but while expressing no opinion regarding the efficacy or otherwise of tebetren on malarial infection in man, we are justified in concluding that this drug has a fairly powerful action on *P. knowlesi*. Intramuscular injections are more effective and better tolerated than intravenous injections, this being probably due to more prolonged contact of the drug with the parasites.

Summary

The results of investigations regarding the action of tebetren on plasmodium infection in *Silenus rhesus* are given. Tebetren is a synthetic drug in which quinine is said to be combined with an acridine dye and bile salts are added to render it less toxic. The results of the experiments on this monkey indicate that tebetren is a fairly efficacious drug in the treatment of infections with *Plasmodium knowlesi*. A dose of $4\frac{1}{2}$ to 6 grains daily for 2 days by the intramuscular route and 3 grains daily intravenously for 3 days controlled fairly heavy infections amounting to as much as a million parasites per c.mm. In so far as the decrease in the number of parasites in the peripheral blood is concerned, tebetren appears to be intermediate in action between atebtrin and quinine. The parasite count is nearly halved 24 hours after an intramuscular injection and degenerative changes in the parasites are evident after the second injection. By the intravenous route, however, the effects are less marked and two or three injections are necessary to bring down the number of parasites in the blood appreciably; in this respect its action resembles quinine.

So far as relapses are concerned, the effects observed resembled more or less those produced in quinine-treated monkeys; the parasites either disappeared spontaneously, or, if they multiplied, the multiplication was slow and except in one case death did not occur. The drug, it seems, combines the virtues of atebtrin and quinine and gives promise of being a useful remedy in the cure of malarial infection. It is on trial on human cases of malaria in the Carmichael Hospital for Tropical Diseases.

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THE PASSAGE OF HOOKWORMS AFTER TREATMENT

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IN industrial practice the impossibility of keeping under control large numbers of coolies for a prolonged period after mass treatment for hookworm infection has led to the employment of various rough and ready methods of assessing the efficacy of such treatment. One of the commonest of these is to examine for the presence of hookworms the first stool passed after treatment. The senior author has several times been asked what he considered to be the value of this method, and while expressing the opinion it was probably not of much use he always had the feeling he might be wrong, because as far as he knew no definite data on the point were available. It was accordingly decided to investigate this question.

The following method was adopted in the inquiry. Only hospital in-patients were made use of because sufficient supervision of out-patients was impracticable. All the patients were treated by our usual routine method; they were given 3 c.cm. of tetrachlorethylene and 1 c.cm. of oil of chenopodium shaken up in two ounces of saturated solution of magnesium sulphate. The treatment was given at 6 a.m. and from this hour until 6 p.m. on the same day all the stools passed were kept separate and individually examined for hookworms by washing through a fine sieve, the times at which all the stools in this first twelve hours were passed was also noted. From 6 p.m. until 6 a.m. the following morning any stools passed were examined for each patient as a whole and

the same was done for the second, third and fourth twenty-four-hour periods respectively.

One hundred cases treated for hookworm infection in the Carmichael Hospital for Tropical Diseases were dealt with in the above manner. Many of these were only light infections as they had been admitted for conditions other than hookworm infection and the latter was only found in the course of the usual routine examinations. It was noticed that the proportion of lightly infected persons failing to pass worms in the first stool was slightly higher than that of those more heavily infected; this point is discussed below.

Seventy-three patients were cured, but as cure or failure to cure had no bearing at all on the passage of worms in the first stool this aspect has been ignored and cured and uncured cases are discussed together. Cure was considered established if the patient showed no eggs in a direct centrifugal flotation preparation ten days after treatment. Egg counts were done on all the patients before treatment with the idea of gaining an approximate estimate of the number of worms that might be anticipated from each case, but as they showed absolutely no correlation with the number of worms subsequently passed they have not been considered.

Altogether 42 of the patients passed no worms in the first stool and 22 passed the first stool between 6 and 6-30 a.m., that is within half an hour of the treatment being given, and eight of these 22 passed worms in the stool. Of the 14 who did not pass worms in the first stool 5 passed their stools between 6 and 6-15 so it is considered better not to include these 5 as failures to pass worms, as it was such a short time after treatment, therefore of this group we can say that 8 passed worms and 9 failed to do so. As a check on the time that worms might be expected to appear in the stools after treatment those passing their first stool between 6-30 and 8 a.m. were taken separately; there were 26 in this group and 13 passed worms while 13 did not do so. A further check was the taking of those who passed their first stools between 8 and 10 a.m., there were 25 in this group and only 10 of them passed worms in the first stool. From these observations it seems safe to assume that the chance of finding worms in stools passed half an hour after treatment is as good as when the stool is retained for over two hours. Therefore, excluding the 5 who passed stools earlier than 6-20 a.m., we can say that 39 persons failed to pass worms in the first stool, and 27 of these passed less than a total of 20 worms.

It was mentioned above that the proportion of failures to pass worms in the first stool was somewhat greater among the light infections, so a division was made between those passing 1 to 19 worms and those passing 20 or more. Out of 55 lightly infected 28 passed worms and 27 did not (this includes 3 who passed stools

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before 6-20 a.m.), and in the 45 with heavier infections 30 passed worms and 15 did not (including 2 who passed a stool before 6-20 a.m.). In the heavy infection group the numbers of worms passed in the first stool in relation with the total number passed are shown in the following list, the left hand figure being the number in the first stool and the right hand one being the total:—0|48, 2|32, 15|27, 1|92, 1|21, 1|36, 2|27, 80|84, 8|29, 7|77, 10|41, 60|67, 234|252, 748|1,249, 92|109, 0|28, 22|27, 32|34, 0|106 (passed at 6-10), 164|199, 219|233, 0|360, 0|31, 0|132, 1|21, 0|27, 0|22, 0|20, 0|29, 0|31, 49|102, 13|66, 182|199, 0|23, 0|157, 0|39, 30|70, 17|82, 4|48, 99|200, 0|112, 18|124, 15|35, 49|94, 651|902.

It is usual for us to give a second dose of magnesium sulphate at 10 a.m. if the bowels have not acted by that time and in the present instance 16 of the cases had to be given this second dose and it was found that the proportion of worms passed in the first stool was considerably higher than the average of the 45 cases shown above, and also 14 of the 16 passed worms in the first stool. Some of the figures in the following list have already been given in the one above and to these have been added the ones who passed less than 20 worms, and needed a second dose of purgative:—49|102, 13|66, 219|233, 0|2, 11|11, 13|19, 164|199, 7|77, 234|252, 10|16, 3|6, 2|2, 32|34, 3|3, 9|10, 0|1.

Although the proportion here is distinctly higher than in the above group it still shows that even after a long delay and the administration of a second dose of purgative by no means all the worms are passed in the first stool. It will be also noted that in this group 3 of the patients passed all the worms in the first stool and were cured, but they only produced 11, 3 and 2 worms respectively. Two other cases were cured that passed all their worms in the first stool, one passing 7 worms at 7-45 a.m., and the other 1 worm at 10 a.m.

Altogether 62 patients passed worms on the second day, and 9 of these had passed no worms on the first day although they all had one or more stools on that day. These 9 were all light infections with the exception of one, and this one had two stools on the first day and passed 127 worms on the second day, followed by 5 on the third. This shows that a delay in passing worms for over 24 hours does not ensure the passage of all in one stool. Another case worthy of special comment is one that passed two stools on the first day with no worms in the first stool and 98 in the second which was passed at 1-10 p.m., this was followed by 243 worms on the second day and 16 on the third day.

Twenty-two patients passed worms on the third day, and in two of these this was the first occasion on which worms were found, but only 2 worms were passed in one case and 1 in the other. Out of 20 patients whose stools were

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CONGENITAL HYDRONEPHROSIS DUE TO AN ABNORMAL ATTACHMENT OF THE RENAL FASCIA (OF GEROTA)

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In the series of 100 cases of ureteral obstruction recorded by Hunner (1918) the occurrence of congenital obstruction due to a fascial band has not been recorded. Eisendrath makes no mention of this anomaly in his studies on congenital strictures.

Obstructions of the ureter may be classified as due to *ureteral* and *extra-ureteral* causes.

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examined on the fourth day 2 passed one worm each and one passed 3 worms.

Disintegration of worms that have been killed by an anthelmintic is fairly rapid in the intestine so it is probable that many more worms were passed than could be recognized as such, especially on the second, third and fourth days. Against this fact it might be advanced that as worms were found on these three days disintegration cannot have been very rapid. The probable explanation of this is that we have found (contrary to the usual opinion) that the majority of worms evacuated as a result of tetrachlorethylene and oil of chenopodium treatment are alive and can be seen moving when placed in water. Although not dead their movements are very feeble compared with worms obtained without treatment as in the course of a post-mortem examination, so what probably happens is that the worms are sufficiently intoxicated by the drugs to make them loose their hold on the gut and not being able to regain it they are swept out in the faeces. The recognizable worms that were found on the second, third and fourth days are probably worms of this class, that have been loosened from the gut but not killed.

As is usual with any series of hookworm infections examined in Bengal the majority of these persons had mixed infections with *Ancylostoma duodenale* and *Necator americanus* with a marked predominance of the latter species, and a careful analysis of our results from the point of view of the influence of the species on the time of evacuation showed that there was no correlation between these two factors.

Conclusion

The above observations clearly demonstrate that after an efficient anthelmintic treatment the examination of the first stool only, after treatment, gives no indication of the number of worms harboured by the patient, nor of how many cases can be regarded as cured.

Of ureteral causes, the majority of cases show obstruction of the ureter near the bladder followed by dilatation of the ureter, a congenital defect in the wall of the duct, an inflammatory stricture, these are all met with. A congenital obstruction at either end has been explained as due to valvular defects. 'Open' hydronephrosis without actual obstruction is explained as due to a want of co-ordination between the muscular wall of the pelvis and that of the ureter, an achalasia of the pelvi-ureteral junction. A similar want of co-ordination has been described by Kutscherenko at the ureteric orifice of the bladder.

An abnormally high position of the ureter in relation to the pelvis is another congenital defect which causes a valvular obstruction. Such anatomical abnormalities have been discussed by Winsbury White (1925). Stenosis of the pelvi-ureteral junction has been especially studied by Geraghty and Frontz (1918). In all such cases the obstruction was definitely due to inflammatory causes.

Extra-ureteral obstruction as a cause is well known as, for instance, in a case of carcinomatous infiltration from the cervix uteri in our own series. In another case in our series a large hydatid of the lower pole of the kidney had caused pressure below the uretero-pelvic junction. The production of tortuosities, kinks and angulations at the pelvi-ureteral junction have been regarded as primary causes, but the experimental work of Caulk and Fischer (1913) on ureteral ligation has raised the question whether such angulations and kinks are the result of obstruction below. However, the abnormal position of the ureter in its relation to the blood vessels in the neighbourhood may cause a true kinking and resultant obstruction. The kinking due to renal descent in a movable kidney is a well-recognized cause.

The condition was noticed in a girl of eight years who was admitted to the surgical ward of the Government Royapuram Hospital, Madras, on 25th March, 1933. She had an abdominal tumour on the right side. This had become noticeable at the age of four and had gradually increased in size for 4 years. There was nothing in the history to indicate any previous abdominal trouble or injury, though it is probable that the swelling had started much earlier. On clinical examination the tumour was found to be a cystic swelling the size of a small melon occupying the right side of the abdomen extending from the costal margin above to the iliac crest below. It was not movable with respiration and appeared to be fixed to the abdominal wall. The colon resonance extended as a band in front of the tumour so a hydronephrosis was suspected. On cystoscopic examination it was found that no urine was escaping from the ureteral opening on the trigone on the right side, indicating that complete block had occurred in the right ureter. At operation it was found that the swelling was due to a hydronephrosis of the pelvi-renal type involving the right kidney and pelvis. The sac was slightly larger than the size of a foetal head. There was a fascial band causing obstruction near the pelvi-ureteral junction and the ureter below was of normal size. There were two large prominent veins, each of the size of a little finger, passing across the pelvis to the pelvi-renal junction.

These were clamped and the whole tumour was shelled out carefully. The patient made an uneventful recovery.

On examination of the specimen it was found that a greyish band of tissue passed from the pelvis to the ureter, just below the pelvi-ureteral junction, and it had caused an upward pull on the ureter. The structure was a well-defined greyish strand about $2\frac{1}{2}$ inches in length, $\frac{1}{5}$ th inch in width at the pelvic part and $\frac{1}{10}$ th inch wide at its attachment to the ureter. The band was flat and tough, and only about $\frac{1}{20}$ th inch in thickness. It had narrowed down at its attachment to the ureter below, but was flatter and more diffuse at its origin in the pelvis. From the ureter below the uretero-pelvic junction, it stretched upwards and outwards to the pelvis and over the pelvis it passed across the front of the kidney over the true capsule of the kidney (figures 1 and 2). Delicate areolar tissue and compressed masses of fat below this band indicated that it was really a part of Gerota's

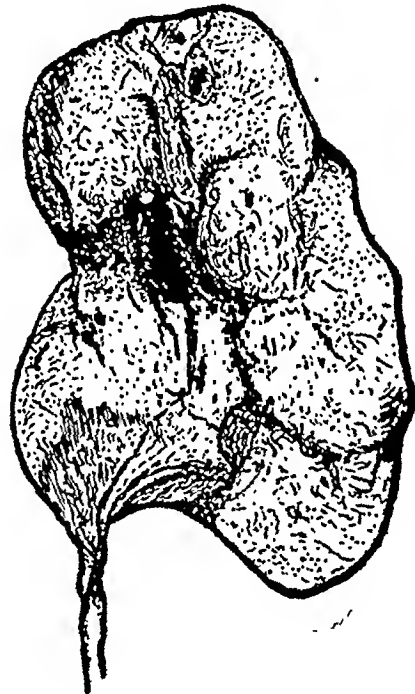


Fig. 1.—Photographic drawing (Shennan's method) of the kidney (half natural size), showing the band passing from the capsule of the pelvis to the uretero-pelvic junction with obstruction and kinking at the junction.

renal fascia which had become stretched out owing to the distension of the kidney. This renal fascia, which normally forms a complete investment of the fatty capsule of the kidney, passes usually over the uretero-pelvic junction; but in this case it had become attached to a point on the ureter about half an inch below, and had caused an upward pull on the ureter and a series of kinks just below the uretero-pelvic junction. The ureter below the point of attachment was normal in size and showed no developmental anomaly. Above the point of attachment, the ureter showed a series of well-defined

kinks the whole tube being folded on itself on a vertical plane somewhat after the manner of a flat spiral (figure 2). There were three distinct angulations without any twisting or rotation.



Fig. 2.—Photograph of the kidney (half natural size), showing the band passing from the pelvis to the uretero-pelvic junction. Note that the point of attachment of the band is at the upper part of the ureter. The photo shows it is continued down for a slight extent along the ureter. Note the engorgement of the veins at the junction between the pelvis and the ureter.

A probe could be passed after traction from above downwards through these kinks, right down to the point of attachment of the fascial band where the lumen was distinctly narrowed. The hydronephrosis that resulted was of the pelvi-renal type, but the pelvis was much more distended than the calyces. The empty pelvis was the size of a large orange, while the kidney substance was spread out as a lobulated mass over the calyces; but the whole mass was much larger before the fluid was let out. The superficial veins on the surface of the pelvis and the pelvi-renal junction were all distended (figure 2) indicating that a pyelo-venous backflow had occurred to a considerable extent as a part of the compensatory mechanism. A section through the sac showed that atrophy of the papillae had occurred, but was not extreme. The vascular markings were altered. Pelvic distension was the most marked feature in this case, while renal atrophy was not extreme.

Microscopically, the most conspicuous feature was the dilatation of the collecting tubules. In some areas where atrophy was not very marked the glomeruli were well formed and were in relation to convoluted tubules which showed little of the collapse and atrophy that occurs in advanced hydronephrotic atrophy. These areas

corresponded to the pyramids where the vascular pattern was preserved to some extent. In between, were areas where the renal tissue showed marked atrophy. The distribution of this atrophy was definitely related to the vascular arrangement; where the vessels were stretched from distension, the renal tissue was replaced by a cellular interstitial tissue, resembling that met with in arterio-sclerotic atrophy.

Discussion

Anatomically it is well known that the uretero-pelvic junction is the point at which there is a distinct narrowing of the lumen of the ureter. This is to some extent due to the stretching of the renal fascia over the junction. The fascial band described in this case is very probably a part of this renal fascia which gained an attachment to the ureter, a little below the uretero-pelvic junction. This has caused a distinct narrowing of the lumen and the upward pull of this fascia had caused a kinking of the ureter. No other developmental structure corresponds to the anatomical site of this fascial band. A careful examination, before and during operation, failed to reveal any significant post-natal condition which would explain the formation of this band. The classification of this condition would therefore be that of an anatomical abnormality, rather than an error of development. Abnormal situations of vessels are well-known causes of hydronephrosis. An abnormal attachment of Gerota's fascia would explain this case. The presence of a series of kinks just above the point of attachment of the fascia is a feature of interest. This lends some support to the experimental work of Caulk and Fischer, and to the view that such kinks are generally due to obstruction below. The marked development of the venous collateral system around the pelvis is in keeping with the view of Hinman (1934) of a pyelo-venous backflow as a part of the compensatory mechanism. The clinical finding of a complete 'block' at the time when the patient was examined is also of some significance, in view of the hydronephrotic type of atrophy that had resulted in the kidney. This lends support to the view that the effect of a complete block is not a primary renal atrophy, as originally believed, but that the atrophy is generally of the hydronephrotic type.

The microscopic picture of dilatation of the collecting tubules and ducts of Bellini, with little change in the convoluted tubules in those areas where the vessels pass directly to the cortex, indicates that the hydronephrotic atrophy in the kidney is due to a direct vascular obstruction. The primary effect of an increased intrapelvic pressure in this case is the dilatation of the collecting tubules and ducts of Bellini.

(Continued at foot of next page)

Of ureteral causes, the majority of cases show obstruction of the ureter near the bladder followed by dilatation of the ureter, a congenital defect in the wall of the duct, an inflammatory stricture, these are all met with. A congenital obstruction at either end has been explained as due to valvular defects. 'Open' hydronephrosis without actual obstruction is explained as due to a want of co-ordination between the muscular wall of the pelvis and that of the ureter, an achalasia of the pelvi-ureteral junction. A similar want of co-ordination has been described by Kutscherenko at the ureteric orifice of the bladder.

An abnormally high position of the ureter in relation to the pelvis is another congenital defect which causes a valvular obstruction. Such anatomical abnormalities have been discussed by Winsbury White (1925). Stenosis of the pelvi-ureteral junction has been especially studied by Geraghty and Frontz (1918). In all such cases the obstruction was definitely due to inflammatory causes.

Extra-ureteral obstruction as a cause is well known as, for instance, in a case of carcinomatous infiltration from the cervix uteri in our own series. In another case in our series a large hydatid of the lower pole of the kidney had caused pressure below the uretero-pelvic junction. The production of tortuosities, kinks and angulations at the pelvi-ureteral junction have been regarded as primary causes, but the experimental work of Caulk and Fischer (1913) on ureteral ligation has raised the question whether such angulations and kinks are the result of obstruction below. However, the abnormal position of the ureter in its relation to the blood vessels in the neighbourhood may cause a true kinking and resultant obstruction. The kinking due to renal descent in a movable kidney is a well-recognized cause.

The condition was noticed in a girl of eight years who was admitted to the surgical ward of the Government Royapuram Hospital, Madras, on 25th March, 1933. She had an abdominal tumour on the right side. This had become noticeable at the age of four and had gradually increased in size for 4 years. There was nothing in the history to indicate any previous abdominal trouble or injury, though it is probable that the swelling had started much earlier. On clinical examination the tumour was found to be a cystic swelling the size of a small melon occupying the right side of the abdomen extending from the costal margin above to the iliac crest below. It was not movable with respiration and appeared to be fixed to the abdominal wall. The colon resonance extended as a band in front of the tumour so a hydronephrosis was suspected. On cystoscopic examination it was found that no urine was escaping from the ureteral opening on the trigone on the right side, indicating that complete block had occurred in the right ureter. At operation it was found that the swelling was due to a hydronephrosis of the pelvi-renal type involving the right kidney and pelvis. The sac was slightly larger than the size of a foetal head. There was a fascial band causing obstruction near the pelvi-ureteral junction and the ureter below was of normal size. There were two large prominent veins, each of the size of a little finger, passing across the pelvis to the pelvi-renal junction.

These were clamped and the whole tumour was shelled out carefully. The patient made an uneventful recovery.

On examination of the specimen it was found that a greyish band of tissue passed from the pelvis to the ureter, just below the pelvi-ureteral junction, and it had caused an upward pull on the ureter. The structure was a well-defined greyish strand about $2\frac{1}{2}$ inches in length, $\frac{1}{5}$ th inch in width at the pelvic part and $\frac{1}{10}$ th inch wide at its attachment to the ureter. The band was flat and tough, and only about $\frac{1}{20}$ th inch in thickness. It had narrowed down at its attachment to the ureter below, but was flatter and more diffuse at its origin in the pelvis. From the ureter below the uretero-pelvic junction, it stretched upwards and outwards to the pelvis and over the pelvis it passed across the front of the kidney over the true capsule of the kidney (figures 1 and 2). Delicate areolar tissue and compressed masses of fat below this band indicated that it was really a part of Gerota's

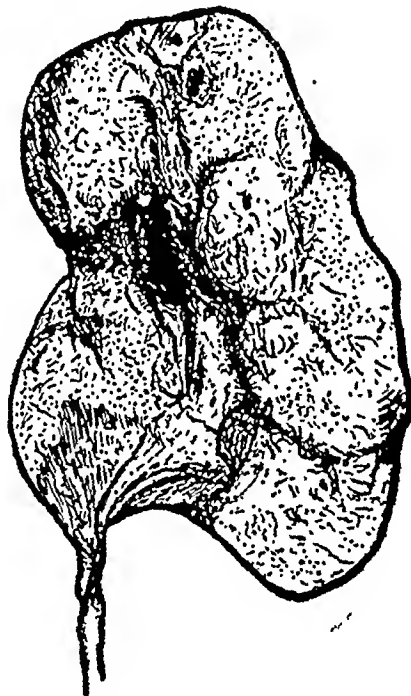


Fig. 1.—Photographic drawing (Shennan's method) of the kidney (half natural size), showing the band passing from the capsule of the pelvis to the uretero-pelvic junction with obstruction and kinking at the junction.

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chemical composition of which is said to be very similar to that of carbarsone. The effectiveness of this drug against chronic intestinal amœbiasis was carefully tested on a series of cases in the Carmichael Hospital for Tropical Diseases. Most of these patients had *E. histolytica* in the stools in cystic form and suffered from general rather than intestinal symptoms. A few of them were admitted into the hospital for diseases other than amœbiasis, but examination of their stools showed a fair number of vegetative or cystic forms of *E. histolytica*. Amibiarsone was administered by mouth in exactly the same way as carbarsone, 0.25 gramme being given twice daily in gelatine capsules for 10 to 15 consecutive days. The patients were kept on ordinary diet and the bowels were kept open with daily administration of a saline purgative every morning while the drug was being administered. If

there was any evidence of a concomitant bacterial infection a course of autovaccine was also administered. The criterion of cure applied in this series of cases was six or more negative examinations of the stools on different days after cessation of all treatment. It has already been pointed out that this criterion for cure does not indicate that a real cure has been effected, but from experience extending over many years in this country we have found that six negative examinations indicate in the majority of cases a favourable prognosis, if not a definite cure. The difficulty of keeping the patient in the hospital when the acute symptoms are once relieved is very great and it was for this reason that this standard of cure had to be accepted. Whenever possible patients were kept under observation longer, and more examinations were made. The results of the investigation are analysed and given below:—

TABLE

No.	Race, sex, and age	Duration and previous treatment	Laboratory findings before treatment	Treatment	Laboratory findings after treatment	REMARKS
1	H., M., 31	3 years; emetine 12 injections.	Scanty <i>E. h.</i> veg.	Amibiarsone 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Cured.
2	A-I., F., 9	3 months; carbarsone 3 months ago without success.	<i>E. h.</i> (veg. and cyst), <i>E. nana</i> .	I. Amibiarsone 0.125 gm., b.d., for 10 days. II. 6 injections of autovaccine (<i>B. pseudo-carolinus</i> from stool).	Do.	Do.
3	A-I., M., 18	6 months ..	<i>E. h.</i> (veg. and cyst), <i>E. nana</i> .	Amibiarsone 0.25 gm., b.d., for 15 days.	Negative 7 exams.	Do.
4	H., M., 29	....	Scanty <i>E. h.</i> veg., hookworm ova, <i>Streptococcus faecalis</i> , <i>B. asiaticus</i> .	Amibiarsone 0.25 gm., b.d., for 7 days.	....	Left on risk bond on the 7th day of treatment. (Indeterminate). Cured.
5	H., M., 50	1 year ..	Scanty <i>E. h.</i> veg., hookworm ova.	Amibiarsone 0.25 gm., b.d., for 15 days.	Negative 7 exams.	Do.
6	H., M., 28	2 years ..	Scanty <i>E. h.</i> veg. and cyst, <i>I. butschlii</i> cysts, <i>E. nana</i> veg. and cysts, <i>Streptococcus faecalis</i> .	Amibiarsone 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Do.
7	H., M., 30	Present attack 2 years. Dysentery 12 years ago. Emetine 21 injections.	<i>E. h.</i> veg., cellular exudates.	Amibiarsone 0.25 gm., b.d., for 20 days.	<i>E. h.</i> cysts, C-L crystals.	Failed.
8	M., M., 38	Originally admitted for diabetes.	<i>E. h.</i> cysts, <i>E. nana</i> cysts, hookworm ova, malignant tertian malaria.	Amibiarsone 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Cured.
9	H., F., 16	4 months ..	Very scanty <i>E. h.</i> veg., ascaris and trichuris ova.	Do.	Do.	Do.
10	I-Ch., F., 45	Originally admitted for filariasis. Dysentery in childhood.	<i>E. h.</i> veg. and cyst, blastocystis, trichuris ova.	Amibiarsone 0.25 gm., b.d., for 15 days.	Negative 5 exams.	Indeterminate.

TABLE—contd.

No.	Race, sex, and age	Duration and previous treatment	Laboratory findings before treatment	Treatment	Laboratory findings after treatment	REMARKS
11	M., M., 37	Admitted originally for lupus erythematosus.	Scanty <i>E. h.</i> cysts, hookworm ova.	Amibiarson 0.25 gm., b.d., for 15 days.	Negative 6 exams.	Cured (negative from the 8th day of treatment).
12	M., F., 36	Originally admitted for chyluria.	Scanty <i>E. h.</i> cysts	Amibiarson 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Cured.
13	H., M., 12	Admitted originally for asthma.	<i>E. h.</i> cysts, giardia cysts, <i>I. butschlii</i> , hookworm ova, ascaris ova, trichuris ova.	I. Amibiarson 0.25 gm., b.d., for 10 days. II. Autovaccine (from sputum) 6 injections.	Negative 9 exams.	Cured (negative from the 8th day).
14	H., M., 16	1 year ..	<i>E. h.</i> cysts, giardia cysts, hookworm ova.	Amibiarson 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Cured (negative from the 8th day of treatment).
15	H., F., 13	2 years ..	<i>E. h.</i> cysts, <i>I. butschlii</i> , <i>E. nana</i> , trichuris ova, tænia ova.	Do.	Do.	Cured (negative from the 8th day).
16	H., F., 20	Originally admitted for anæmia, suffered from dysentery 4 years ago.	<i>E. h.</i> cysts, <i>B. lactis ærogenes</i> .	Do.	Do.	Cured.
17	H., F., 39	22 years ..	<i>E. h.</i> cysts, <i>B. pseudocarinatus</i> , hookworm ova, <i>A. metalcaligenes</i> .	I. Amibiarson 0.25 gm., b.d., for 10 days. II. 6 injections of autovaccine (<i>B. pseudocarinatus</i>).	I. Negative 6 exams. II. Giardia cysts.	Do.
18	H., M., 30	6 months for the present; suffered from amebic dysentery 12 years ago.	<i>E. h.</i> cysts, hookworm ova.	Amibiarson 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Do.
19	H., M., 35	7 years ..	<i>E. h.</i> cysts, hookworm ova, giardia cysts.	Do.	Do.	Do.
20	M., F., 16	Originally admitted for contracture of hand (hysteric).	<i>E. h.</i> cysts, hookworm and trichuris ova, <i>B. jæcalis alkaligenes</i> .	Do.	Do.	Do.
21	H., F., 11	1 year ..	<i>E. h.</i> (veg.), giardia cysts, <i>B. jæcalis alkaligenes</i> , <i>B. pyocyaneus</i> , <i>B. paratyphosus</i> (?).	Amibiarson 0.25 gm., b.d., for 15 days.	Negative 7 exams.	Do.
22	M., M., 55	3 years, dysentery 15 years ago.	<i>E. h.</i> (veg.)	Amibiarson 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Do.
23	H., M., 29	12 years emetine. Cabarsone (Lilly) Gavano Autovaccine Kurchi	<i>E. h.</i> cysts, <i>B. pyocyaneus</i> .	I. Amibiarson 0.25 gm., b.d., for 10 days. II. Amibiarson 0.25 gm., b.d., for 5 days after an interval of 5 days.	Degenerated <i>E. h.</i> cysts. Negative 6 exams.	Do.
24	H., M., 32	6 months ..	<i>E. h.</i> cysts, hookworm ova.	Amibiarson 0.25 gm., b.d., for 10 days.	Do.	Do.
25	M., M., 21	Originally admitted for filariasis.	<i>E. h.</i> cysts, hookworm and trichuris ova, <i>B. lactis ærogenes</i> , urine culture staphylococci.	Amibiarson 0.25 gm., b.d., for 15 days.	Negative 7 exams.	Do.

TABLE—cont'd.

No.	Race, sex, and age	Duration and previous treatment	Laboratory findings before treatment	Treatment	Laboratory findings after treatment	REMARKS
26	H., F., 45	Originally admitted for dermatitis.	<i>E. h.</i> cysts, <i>B. pseudo-carolinus</i> , <i>B. lactis aerogenes</i> .	Amibiarson 0.25 gm., b.d., for 15 days.	Negative 4 exams.	Indeterminate.
27	E., F., 9	1 month ..	Scanty <i>E. h.</i> (veg.), <i>B. pseudo-carolinus</i> .	I. Amibiarson 0.125 gm., b.d., for 10 days. II. 6 injections of autovaccine (<i>B. pseudo-carolinus</i>).	Do.	Do.
28	H., M., 20	6 months ..	<i>E. h.</i> (veg.) + +, C.-L. crystals + +, atypical flexner.	I. Amibiarson 0.25 gm., b.d., for 10 days. II. 6 injections of autovaccine.	I. Scanty <i>E. h.</i> (veg.), C.-L. crystals. II. After the course of vaccine <i>E. h.</i> (veg.), C.-L. crystals.	Failed.
29	H., M., 30	Originally admitted for malaria.	<i>E. h.</i> (veg. and cyst), <i>E. nana</i> (veg. and cyst), blastocystis + +, hookworm and ascaris ova and strongyloides larvæ.	Amibiarson 0.25 gm., b.d., for 10 days.		Pt. left on the 6th day of treatment. Indeterminate.
30	E., M., 32	Since childhood; worse recently.	<i>E. h.</i> (veg. and cyst) +, <i>E. nana</i> (veg. and cyst) +, blastocystis +, <i>B. faecalis alkali-genes</i> .	I. Amibiarson 0.25 gm., b.d., for 10 days. II. 6 injections of autovaccine.	Negative 4 exams.	Indeterminate
31	M., F., 38	5 years ..	<i>E. h.</i> (veg.), scanty <i>E. nana</i> (veg. and cyst), + +.	Amibiarson 0.25 gm., b.d., for 10 days.	<i>E. h.</i> (veg.) + C.-L. crystals +	Failed.
32	A.-I., M., 3	....	<i>E. h.</i> (veg. and cyst) +.	Do.	Negative 2 exams.	Indeterminate.
33	Jew, F., 46	1 month for the present, dysentery 5 years ago.	<i>E. h.</i> (veg.) +	Do.	Negative 6 exams.	Cured.
34	H., M., 7	Originally admitted for hæmophilia.	Scanty <i>E. h.</i> (veg.), oxyuris and trichuris ova.	Do.	Negative 7 exams.	Do.
35	A.-I., M., 21	Originally admitted for malaria.	<i>E. h.</i> (veg.) +.	Do.	Negative 4 exams.	Indeterminate.
36	M., M., 25	1 year ..	Scanty <i>E. h.</i> (veg.), hookworm ova, <i>B. pseudo-asiaticus</i> .	I. Amibiarson 0.25 gm., b.d., for 10 days. II. Amibiarson 0.25 gm., b.d., for 5 days.	Scanty <i>E. h.</i> veg. Negative 3 exams.	I. Failed. II. Indeterminate.
37	H., M., 24	Originally admitted for elephantiasis leg. Dysentery 12 years back.	Scanty <i>E. h.</i> (veg. and cyst), hookworm ova.	Amibiarson 0.25 gm., b.d., for 10 days.	Negative 6 exams.	Cured.
38	M., M., 40	5 years emetine	<i>E. h.</i> (veg.) + +, cellular exudates + + +.	I. Amibiarson 0.25 gm., b.d., for 10 days. II. Amibiarson 0.25 gm., b.d., for 5 days more.	I. Scanty <i>E. h.</i> (veg.). II. Negative 2 exams.	Failed. Indeterminate.

A Mirror of Hospital Practice

A CASE OF INTESTINAL OBSTRUCTION CAUSED BY EXTRA-UTERINE PREGNANCY

By S. R. GORE, L.M. & S.

Honorary Surgeon, The Hubli Co-operative Hospital Society, Hubli

G. D., AGED 28, was admitted to the Co-operative Hospital, Hubli, in the afternoon of 29th January, 1935, for intestinal obstruction.

Her condition was grave; thready rapid pulse, cold perspiration, anxious look, frequent vomiting of large quantities of liquid faecal matter, and distended abdomen were the marked symptoms. Patient was given an enema before admission but as it had no effect she was brought to hospital.

On examination the lower portion of the abdomen up to the umbilicus was dull to percussion and there was tympanites above. There was a bloody discharge from the vagina. The patient was examined about ten days previously in the outpatient department for pain in the abdomen, amenorrhœa of three months' duration and tumour. She gave a history of irregular and profuse menstruation for a couple of months previous to the amenorrhœa and the tumour was noticed during this period. It was a right-sided tumour, its feel was irregular and hard and it seemed fixed. She had had no children before this. She was examined *per vaginam* by my colleague, Miss Engineer, who reported that the os uteri was soft and the breasts were areolated and there was milk in them. She diagnosed pregnancy but said the feel was queer. She could not hear either uterine souffle or foetal heart sounds. I was not allowed to examine *per vaginam* and a diagnosis of pregnancy of three months with a fibroid of the broad ligament was made by me as the period of three months' amenorrhœa was insufficient to explain the size of the tumour and no foetal heart sounds were heard. I took the tumour which was one-sided to be a fibroid. Patient was advised to stay in the hospital and that an operation was necessary. She refused to stay and went back to her village. With this history in mind, I thought that the obstruction was due to the impaction of the tumour. I had previously seen a case of a big pedunculated fibroid jammed in the pelvis causing obstruction and gangrene of about two feet of the ilium. As the condition of the patient was extremely grave I thought that an operation could not be undertaken unless the pulse improved. I therefore directed the house surgeon to wash out her stomach every two hours during the night and give her glucose and saline intravenously.

The next morning, though the condition was still serious, I could at least feel the pulse and there was no cold perspiration. I decided to do an enterostomy to relieve the condition and then tackle the tumour at a later date if she improved. An incision of one inch was thus made below the umbilicus in the midline, under local anaesthesia. On opening the peritoneum a foul-smelling reddish discharge escaped but no loop of the gut protruded. The finger was therefore introduced and a soft placenta-like mass felt; on going further in by the side of this, I felt the limbs of the foetus. The incision was then enlarged downwards after injecting novocain and the foetus removed, the cord was black and was easily torn away while extracting the foetus. The placenta which was attached to the anterior abdominal wall and loops of the intestine was almost detached of itself and was easily removed without any bleeding. After mopping away the fluid in the cavity a gauze drain was introduced and two through-and-through stitches were put in the upper end of the wound. The pressure of the impacted head of the foetus being removed it was thought unnecessary and inadvisable to disturb the intestines and even the

uterus to ascertain which tube was responsible for the pregnancy. The uterus was retroverted and was being pushed down by the foetal head causing pressure on the pelvic colon and thus obstructing it.

In the ward 1 c.cm. of pituitrin was injected and a flatus tube inserted. She had neither passed flatus nor stool till midnight but the vomiting had stopped. She was restless so the stomach was again washed with bicarbonate of soda solution in the evening, and intravenous saline with glucose was given at midnight with 2 c.cm. myosin intramuscularly. On the 31st, flatus was being passed through the tube and in the evening she had a copious motion. This was followed by diarrhœa for a couple of days. She had lung complications but ultimately recovered and was discharged cured on 13th March, 1935.

A CASE OF HYSTERICAL HICCOUGH*

By A. C. ROY

Charitable Dispensary, Balagaria, Midnapore

A FEW months ago a Hindu male, aged 35 years, came to the dispensary complaining that for the last two years he had been involuntarily making a retching noise.

Previous history.—His relatives said that eight or nine years ago he was insane, insisting on removing his clothes, but he had ceased behaving in this manner for a long time now. About two years ago the man became unconscious and a little blood trickled out of his mouth. He quickly regained consciousness following the application of cold water to his head. Shortly after this he commenced to make the noise complained of and this has continued ever since.

Examination.—The patient stands and walks with the head and upper part of the body slightly tilted backwards; this only began after the attack of unconsciousness. No other abnormality was found and there is no defect in his talking voice.

The man makes a sound somewhat like that of retching five or six times a minute except when talking or when he is asleep. He holds his mouth half open and when ordered to close it and he breathes through his nose the sound continues. He was quite unable to stop making the noise by exercise of his will.

A mixture containing valerian, belladonna and arsenic was prescribed and the intervals between the noises gradually increased and finally they ceased altogether after he had been taking the medicine regularly for three weeks. One month later the man began again to make the noises but a repetition of the mixture rapidly cured him.

The history of mental instability, the absence of any apparent cause, and the nature of the cure suggest that the case is one of pure hysteria.

A CASE OF ANOPHTHALMOS

By INDRASINH, L.C.P. & S. (Bom.)

Central Hospital, Alirajpur, C. I.

A BABY aged 5½ months, resident of Nanpur in Alirajpur State, was brought to the outpatient department of the Central Hospital on the 31st January, 1935, the mother complaining the child was unable to see. I tried to separate the lids, but was unable to expose the eyeballs, as the former were adherent in the greater part of their length except a small portion in the centre.

The baby was put under ether anaesthesia and the eyeballs were found to be simple cystic structures overlapped with conjunctiva. The condition was bilateral and there were no other anomalies such as harelip. The orbit was smaller than normal.

*Rearranged by Editor.

Indian Medical Gazette

JUNE

ASCARIS INFECTION AND THE BORE-HOLE LATRINE

NEARLY five years ago we discussed in an editorial the problem of infection with *Ascaris lumbricoides*. At that time we drew attention to the need for proper disposal of night-soil as well as treatment of infected persons if this widespread infection were to be controlled.

Since that time research has shown that treatment alone is quite ineffective, and that if an infected community is treated without improvement in sanitation the infection rate returns to its original degree and intensity in less than three months. In this respect the ascaris problem differs from the hookworm problem because thorough and periodical treatments for the latter infection have been shown to reduce the community rate and even more markedly the individual intensity of infection of a heavily infected community, and that they do not rise to their original level for a much longer time.

It is generally agreed that ascaris infection is fairly rapidly lost, or at all events considerably reduced, if reinfection is prevented. This fact combined with the knowledge that treatment alone is useless emphasizes the necessity of the proper disposal of infected stools as being the only solution of this problem, in the present state of our knowledge.

Recently Clayton Lane has collected one or two records which indicate the possibility that imperfect sanitary measures actually lead to an increase in infection rate with ascaris. How this occurs is not yet clear, but it is a disturbing thought and indicates that the problem is not quite as simple as at first sight it appears. The two principal instances quoted by Lane are one of his own finding in the Darjeeling district some years ago and the other in some small villages in Panama. In the Darjeeling instance the most heavily infected tea garden coolies were found in the only garden where any attempt at installation of latrines existed, these were only seats overhanging a deep ravine and the stools just fell down the steep hillside where they were left to putrefy. In Panama pit latrines were instituted at individual houses in the villages. Later examination showed that they were not being used by all the inmates of the houses, and that the children were the chief delinquents. Clayton Lane suggests that the ascaris eggs are air-borne and enter the houses to contaminate the food, but this suggestion seems of doubtful accuracy, in Panama—at all events, for there the rise in infection rate

occurred at the height of the wet season, which is exceptionally heavy and continuous, so that it is difficult to imagine such relatively large and rounded bodies as ascaris eggs being carried by air at such a time. But whatever the cause of this increase in infection after installation of latrines the faeces in the Darjeeling example were freely exposed and in Panama they were in open latrines of the pit type though covered by buildings and seats.

For the past few years bore-hole latrines have been widely advocated principally by sanitarians of the Rockefeller Foundation and they are now in use to a great extent in the Malay States and the Dutch Indies, but they have not made much headway in India although they are used to some extent in Madras Presidency and one or two other areas. If air-carriage of eggs after the installation of inadequate latrines is the correct explanation of the failure to reduce or to even cause an increase in ascaris infection, the bore-hole latrine should not be open to this objection, especially if bored deep enough to enter the sub-soil water, a condition that will apply in the plains of Bengal and Assam.

It has been shown over and over again that partial use of latrines by a community has practically no effect in reducing intestinal worm infections of any kind, and that if any benefit is to be derived from their installation the whole population (especially the children who are given to defæcating close to the houses) must make use of them. Bore-hole latrines have the great advantages of cheapness, and speed and ease of construction so that they can be supplied quickly to all the houses of a community such as a coolie line or small village. Each house being furnished with such a convenience means that it will be near the dwelling, and this proximity should go a long way towards encouraging their regular use by the inhabitants as will also the privacy thus afforded, compared to that of a large central public latrine. Fouling of the latrine and its surroundings seems to us much less likely to occur in these small private latrines than in the large public type where this is a very real disadvantage. For one reason, persons are always more inclined to take proper care of their own property than that of the public, and another reason is that if fouling does occur it will be much easier to discover the culprit and deal appropriately with him among the members of a single family.

If bore-hole latrines reach the sub-soil water and not too many individuals use each one complete liquefaction of faeces will occur and the liquefied matter will percolate through the soil and so become completely lost. In some countries where night-soil is a source of manure for vegetables and cereal crops the establishment of latrines from which the faecal material cannot be recovered is strongly objected to by the

agriculturists because an important source of income is lost to them. In India this difficulty at least is absent because night-soil is practically not used at all as manure.

It must be remembered that from the evolutionary standpoint the sanitary disposal of faeces is a very recently acquired habit of the human race, and is the direct result of our discoveries in the epidemiology and transmission of many diseases and the education of the public therein. Amongst the highly educated, cleanliness in this respect is now almost instinctive, but it is surprising how careless and insanitary many of the less-educated are even among the most civilized races. Accordingly it should be remembered that the sudden introduction of latrines to a primitive people is a most severe disturbance of the routine that has existed from the beginning of the race, and that a certain amount of opposition will always be met with, and difficulty will be experienced in finding a few members of the community sufficiently adventurous to begin this entirely unheard of habit of using latrines, and thus to make a start in the education of the whole population.

If the first latrines are of a public character and for the general use of the community, as they often are, they will be objected to on several grounds; firstly the building itself will probably be of a type to which the native is unaccustomed so he will hesitate to enter such

a strange place, secondly it is a deeply ingrained instinct to seek privacy for the act of defæcation (this can often be observed even among the lower animals) consequently the people are unwilling to throw aside the habit of generations of retiring secretly to the bush for this purpose and instead of this to parade publicly through the village and enter the latrine in full view of many of their companions, and lastly public latrines are very often allowed to get into such a filthy condition and are so offensive that objection to their use is not at all unreasonable.

Bore-hole latrines, on the other hand, are small, they can be situated close to the houses and can be covered with simple bamboo or grass shelters, a type of architecture to which the native is accustomed, and so he will have no fear in entering them, they are quite private and on account of the comparatively few persons who use each one of them the surrounding surface is less likely to become fouled and offensive.

On account of the advantages we have detailed this type of latrine appeals to us as the type most likely to be successfully used by primitive peoples. Accordingly they should be the most efficient in controlling the scourge of intestinal helminthic infections, especially that of *ascaris*, which is of much more importance among rural communities in the tropics and sub-tropics than is generally recognized.

Commentaries

STUDY OF THE CHOLERA VIBRIO

THE EPIDEMIC AND ENDEMIC TYPES OF CHOLERA VIBRIOS

By D. DOORENBOS, M.D.

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IN this brochure, Dr. Doorenbos, by dividing cholera vibrios into two definite types, viz, the *epidemic* and the *endemic*, attempts to reconcile and explain the many diverse and puzzling observations and findings that have been made at different times, and in different countries and circumstances, regarding the cholera vibrio. While most will question the justifiability of this division in the present state of our knowledge, nevertheless the brochure contains much interesting matter both of fact and speculation. Taking certain facts first, Dr. Doorenbos records that agglutination by a high-titre serum as a fundamental diagnostic property of a 'true' cholera vibrio was first laid down by Kolle and Gotshlich in 1903. This choice by Kolle of an epidemic cholera vibrio as the only true and veritable antigen was arbitrary and a great deal of the present confusion is due to this choice. Kolle and Gotshlich in Egypt, however, themselves found many discrepancies in this agglutination reaction, but attributed the irregularities to faults in plating technique and to contaminations. In 1905 Gotshlich at El Tor found in returning pilgrims the types of vibrios now associated with the name 'El Tor'. These were

agglutinable and hæmolytic, and were not associated with cholera cases, nor was there any cholera in the Hedjaz that year. (Doorenbos rightly distinguishes between the hæmo-digestion found in solid media, and the hæmolysis in liquid media. Much confusion has arisen in the literature by misstatements in this respect.) Their agglutinability, according to accepted opinion, placed these El Tor vibrios in the class of true cholera vibrios, but their hæmolytic property and their lack of any association with cholera cases were at variance with this view. The discovery, notably by Pasricha, that true cholera in an endemic area was associated with non-agglutinable vibrios especially at the beginning of the epidemic season was another reflection on the property of agglutination being essential to virulence. In epidemics outside endemic areas, however, the agglutinable vibrio seems to predominate. The finding of non-agglutinable vibrios in large percentages of healthy people in endemic areas in Bengal by Tomb and Maitra, and B. B. Brahmachari, and the comparative rarity of carriers of agglutinable vibrios in such areas, were facts difficult to appraise. The sanitary authorities in Syria in 1931 found large numbers of healthy carriers of agglutinable vibrios coming from Iraq which at the time was infected with epidemic cholera, but they found similar carriers also from areas which were quite free of infection. These agglutinable vibrios occurred also amongst inoculated persons. What is the significance of all these observations? What parts do agglutinable and non-agglutinable vibrios play in the occurrence of cholera; what is the part played by the so-called healthy

carriers of the non-agglutinable and agglutinable vibrios? What is the explanation of endemicity, and how should we account for the different behaviour of vibrios in endemic and epidemic areas? These and many other related questions need solution and most workers agree that speculation at the present stage is not justified, but that further investigation and observation, at first in an endemic area, are necessary. This is the view taken by the Indian Research Fund Association which has financed investigations into the problems of endemicity at the School of Tropical Medicine and the All-India Institute of Hygiene and Public Health; and in which the Central Research Institute of Kasauli and the Pasteur Institute of Assam are also co-operating.

Dr. Doorenbos, however, thinks that speculation is justified and has postulated certain ideas. If we understand him correctly he would envisage the various stages in the carriage of cholera somewhat as follows:—

(1) Taking the height of an epidemic (either in an endemic or non-endemic area) as a starting point, ultra-pure vibrios are alone found. These vibrios are agglutinable, they completely absorb agglutinins and give a positive Pfeiffer reaction; they produce no hæmolytic in a liquid medium, and are lysable by cholera bacteriophage. They are what Doorenbos calls the *epidemic* type of vibrios. They breed unaltered from culture to culture. In epidemics in non-endemic areas, the ultra-pure type predominates throughout. They are usually phage free.

(2) As the epidemic wanes, these ultra-pure vibrios are replaced by modified types, often non-agglutinable, and variable also in their reaction to blood medium. These vibrios are probably symbiotic with phage, and their characters on subculture often vary from culture to culture. They are derived from the ultra-pure types probably by phage action and are the *endemic* type of vibrio. In an endemic area these types persist (probably both in human beings and in water) in inter-epidemic periods. In a non-endemic area there is a complete disappearance of all types, and reintroduction is necessary for another epidemic to occur.

(3) At the resumption of an epidemic in an endemic area, modified types appear at first, being replaced by ultra-pure epidemic types at the height of the epidemic; and so the cycle is completed.

The gap in knowledge lies between the endemic type of vibrio which does not cause cholera and the same organism when, and if, it starts to cause cases of cholera. It is our ignorance in this matter that makes unjustifiable the assumption of applying the two terms 'epidemic' and 'endemic' to the organisms.

Doorenbos distinguishes between cholera-genic capacity and virulence. By the former term is meant the capability of producing cholera-like symptoms either in man or in the rabbit (in the latter by enterotrophy in association with other intestinal organisms). By 'virulence', however, he means the property of being able to initiate the entity of human cholera and to carry it on from case to case. In this sense the authentic or *epidemic* vibrio is both cholera-genic and virulent. The *endemic* type is cholera-genic only and not virulent. It can produce sporadic cases of cholera or cholera-like symptoms, but cannot start an epidemic. The endemic type according to Doorenbos is transmutable in nature in endemic areas at least into the epidemic type, but the factors operating in this transmutation are unknown. The Hedjaz, though not an endemic area, has within it the properties of converting the endemic into the epidemic type. These are the main points of Dr. Doorenbos' thesis as presented in his brochure. These ideas are not new; they are practically those postulated by Tomb and Maitra in 1930. In addition there are in the brochure interesting data about methods of isolating the vibrios from large numbers of individuals at one time, and a description of the El Tor quarantine station. Though we may not agree with Dr. Doorenbos' speculations or

rather that we consider they are not justified, with our present knowledge, nevertheless he has written an interesting booklet which all workers on cholera will read with interest and pleasure.

(Dr. Doorenbos' communication, we note, was considered by the Cholera Commission at the October 1934 meeting of the Office International. The Commission record their opinion as follows. Referring to the terms *typus epidemic* and *typus endemic*, the Commission state 'It appears that Dr. Doorenbos is creating a new term for what are probably cholera variants, and the Commission considers that the nomenclature suggested is misleading. The statement that these forms are essentially reversible is one which the Commission does not consider to have been proved. During a recent pilgrimage the examinations of stools at El Tor on the outward journey did not result in the discovery of any carriers, but on the return from the Hedjaz a proportion showed vibrios. From this Dr. Doorenbos concludes that a specific source of infection must exist in the Hedjaz. The delegate from Dutch East Indies has suggested the advisability of carrying out examinations of pilgrims at ports of departure in his country and also in British India to determine whether they carry vibrios which are later picked up by the pilgrims from Egypt. It might be considered whether this could be done at Bombay'.)

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Special Article

THE IMMUNOLOGICAL PROBLEMS OF THE TYPHUS FEVER GROUP AS RAISED BY A SPORADIC CASE OF TYPHUS (VECTOR UNKNOWN) FROM HAMIRPUR IN THE PLAINS OF INDIA WITH A NOTE ON THE HISTORY OF TICK TYPHUS IN INDIA

By H. STOTT, M.D., F.R.C.P., D.P.H.

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OF the many brilliant services rendered to tropical medicine in India by Major-General Sir John Megaw, K.C.I.E., I.M.S., one time Professor of Pathology and Principal of King George's Medical College, Lucknow, and Physician to the Hospital, perhaps none have become more important than his publication of the first clearly recognized case of tick typhus which he himself contracted in 1916 near Bhim Tal in the Himalayas (Megaw, 1917 and 1921). This publication was followed by his diagnosis of the second case of tick typhus recognized in India which was also investigated at this Medical College, and by his subsequent writings on the typhus fever group (Megaw, 1921, 1924 and 1925). It is therefore not unfitting that the third case of tick typhus, diagnosed at King George's Medical College, should be reported, and the more so since the investigation of this third case raises problems of great immunological interest, extending beyond the realm of tick typhus, to the whole typhus and rickettsia group and, even, into the more obscure problems of immunology itself. These problems which at present can be only lightly hinted at are best approached by a consideration of:

I. The history of the recognition and diagnosis of tick typhus in India.

II. The clinical history of the third tick typhus case at King George's Medical College.

III. The immune responses demonstrated in this third case and by the typhus fever group as a whole.

This third case is described here as tick typhus, but in fact the vector was unrecognized. A more accurate scientific diagnosis would be a case of sporadic typhus due to an unknown vector.

I. THE HISTORY OF THE RECOGNITION AND DIAGNOSIS OF TICK TYPHUS IN INDIA

The history of the recognition and diagnosis of tick typhus in India is a history of three well-defined steps. These three steps are instructive and well worthy of recollection. The first step was McKechnie's recognition on clinical data that the endemic continued fever of Bhim Tal was mainly a subvirulent typhus infection, which however had not the usual typhus epidemiology, but was sporadic and unassociated with lousy conditions. The second step was Megaw's aetiological observation that a case of Bhim Tal fever followed a tick bite—and that its sporadic nature was due to the life habits of that insect, viz, a chance bite of an infected tick in the jungle wilds. Further, Megaw stressed the similarity of Indian tick typhus with the spotted fever of the Rocky Mountains which was known to be conveyed by tick bites. The third step was the curious serological findings in typhus serum which came to be recognized as obscuring the diagnosis and which are more fully noted below.

Step 1.—McKechnie's clinical recognition that the mild endemic, continued fever of some 15 days' duration of Bhim Tal, though unassociated with lice, was due to mild typhus and not to mild typhoid infection.

For long it had been known that a continued fever of some ten to fifteen days was endemic in the small hill stations of Bhim Tal and the adjoining Sat Tal which were located at a height of 4,500 feet above sea level near Naini Tal, the summer headquarters of the Government of the United Provinces. European visitors to these places readily contracted this fever which was generally believed to be due to typhoid or to paratyphoid infection. And this belief was supported by a number of positive Widal reactions. During four months in 1913, Major (now Lieutenant-Colonel) McKechnie, I.M.S., investigated these endemic cases starting with the preconceived popular idea that he was dealing with 'enterica' which diagnosis a certain number of positive Widal reactions seemed to support. Blood cultures however were completely negative. Once Assistant Surgeon Hardy, I.M.B., suggested a diagnosis of typhus in the case of a European lady at Sat Tal, but Major McKechnie, scouted the idea 'on the epidemiological grounds that typhus was a disease of city slums, of filth, of overcrowding and of bad ventilation and not at all the kind of disease that one would expect to find in a lady living in a cottage in the Sat Tal jungle'. And Assistant Surgeon Hardy revised the diagnosis to the more acceptable one of paratyphoid A. Major McKechnie's soliloquy on this incident is worth quoting in full. 'Thus does authority browbeat us all, and, obsessed as we are by *obiter dicta* and dogmas, which, though no doubt applicable to the circumstances under which they arose, are not necessarily of universal application, the tender shoot of truth attempting to rear its head is blighted by the cold wind of tradition'. But owing to the constant negative blood cultures, the irregular Widal results, the short average duration of the fever (thirteen days), and the wide distribution of the copious rash, Major McKechnie was gradually forced to the conclusion that in the majority of cases he was not dealing with even mild typhoid. He further noted that 'there were only typhus fever, Brill's disease, and the spotted fever of the Rocky Mountains amongst the continued

possible epidemic fevers which failed to yield positive blood cultures'. After a thorough investigation of a further case, in which the Widal reactions were fortunately found negative, Major McKechnie wrote 'I simply had to revise my notion and then I found that the only thing against my thinking of typhus for other cases which had occurred was my obsession as to the epidemiology. If some of the cases were typhus then it must be the obsession that was wrong'. McKechnie concluded that typhus fever, usually subvirulent, was endemic in this area, and was the chief danger to the health of Europeans there. Major McKechnie's most valuable contribution to the study of typhus group in India was this recognition of a subvirulent, endemic, localized form, associated with jungle life, and in which filth and overcrowding and famine played no part. As Megaw states it is a matter of great regret that Major McKechnie merely submitted his report in the official manner to Government and did not publish so instructive and human a document. We, however, owe, much to Megaw (1921) for his review of it from which the above extracts are made.

Step 2.—The next historical step forward was the fortunate circumstance (fortunate that is for Tropical Medicine in India) that Megaw himself contracted the disease following a tick bite near Bhim Tal and thus had his interest aroused in it. His great contribution was the recognition of the fact (and his teaching and publication thereof) that there existed in various parts of the world (e.g., in the Rocky Mountains of America) a mild variety of typhus fever which occurred in endemic rather than in epidemic form and was unassociated with filth, overcrowding and poverty, but rather with open-air life in the jungle wilds and thus was conveyed, probably, by ticks and not by lice. Megaw formed 'the strong opinion' that the infection was one primarily affecting animals of the jungle (rodents) and was conveyed to man by a tick. Megaw also stated his belief that the disease was probably widely distributed in the hills and plains of India and also in other parts of the world but that the disease remains unrecognized because of its superficial resemblance to typhoid fever. On the nosological side Megaw's very practical classification of the typhus fever group into (1) Louse, (2) Tick and (3) Mite typhus (the latter a disease of recently flooded places) and into (4) Typhus of Unknown Vector, further clarified the position whilst his writings, teaching and addresses widely diffused this new knowledge. Megaw's first two cases both at King George's Medical College are briefly recorded in the appendix. Further cases were reported from Nagpur and Saugor in Central India, from Bangalore in Mysore, from Angul in Orissa, from Dacca in Bengal, from Akyab in Burma, from South Africa (McNeight), from Australia and from Nigeria. The experience of the last few years seems to indicate the wide distribution of this disease.

Step 3.—The third step is the recognition on the serological side of the widespread prevalence of different antibodies in typhus serum during and towards the end of fever (e.g., typhoid and proteus agglutinins, syphilitic amboceptor and opsonin). In the past this widespread prevalence has led to confusion (1) in the serological diagnosis of typhus fever from the typhoid group, (2) in attempts to subdivide the typhus group according to the agglutination response of typhus serum to various strains of proteus bacillus and (3) in the support of claims put forward for various organisms to be the real bacterial cause of typhus since such organisms agglutinated with apparently homologous antibodies in the typhus patient's serum. The present paper is mainly directed to the varied heterologous antibodies so often present in typhus serum.

II. CLINICAL HISTORY OF THE THIRD TICK TYPHUS CASE AT KING GEORGE'S MEDICAL COLLEGE

The Rev. S., a pure-born American missionary, 28 years of age, was admitted into my ward in King

I. The history of the recognition and diagnosis of tick typhus in India. The

II. The clinical history of the third tick case only case at King George's Medical College. is still the

III. The immune responses demonstrated

third case and by the typhus fever general condition. This third case is described here. The pains and in fact the vector was unrecognized as disappearing first scientific diagnosis would be a thigh with the gradual due to an unknown vector. normal on this the twenty-every. The spleen which had

the history of the breadth was not receding. By the 14th the agglutinins which had reached 1/250

descent for history to 1/2,500 on the 10th. November, the patient had been convalescent for a week. The rash had disappeared from the face, arms and arms and was rapidly fading from the

On the 28th November the patient was discharged from hospital, completely convalescent. The rash staining was still obvious on the feet, round the ankles and up to the knees. Each stain was lean ham and coppery in appearance and from about one-quarter to one-half inch in diameter. The staining could be clearly made out on the palms and soles. Desquamation was present in these areas but not on the body. The rash had disappeared as follows, from the chest, body, face, hands, feet, i.e., in the same order as of appearance. On the 1st December, staining was still present on the palms and soles, slightly on the forearms and to a somewhat greater extent on the legs.

Diagnosis.—The clinical diagnosis of tick typhus in this case was clear. The onset occurred (1) in an American Missionary non-immune to the locality. (2), who had been camping in tents in contact with village and open jungle life for 15 days previous to the onset of his infection (i.e., the common incubation period of 7 to 12 days lay within the exposure period). The second case of tick typhus reported in the appendix was that of a forest officer working in the jungles of Hamirpur, who contracted his infection in the same month (October). An endemic centre may therefore be presumed in this area though no definite evidence is at present available. (3) His camps were pitched in an area known to be more tick-infested than most other areas of the United Provinces and in an area where tick fever in horses and dogs (though the infecting agent is believed to be quite different) is also not uncommon. He too had himself seen many ticks during his present tour. (4) The fever curve which rose slowly and ended by lysis after lasting for 21 days was somewhat longer than the extremes of 10 to 19 days given by Megaw, but the early and latter days of fever were very slight, and the days on which the maximum temperature was 100°F. or above were only 15. The remittent type of temperature was more typical. (5) The copious and conspicuous rose-red macules distributed all over the body but especially on the face, hands and feet, disappearing on pressure, erupting about the third day, turning at first darker red and then coppery brown and, finally, fading with the fall of the temperature to dull reddish stains, were distinctive. Very few spots were petechial. (6) The suffused eyes, throat and face were as usual. (7) The acute muscular and peri-articular pains and especially the backache were typical symptoms as in the Saugor (C. P.) cases observed by Shettle (Megaw, 1925), in which the fever also lasted up to 20 days, with daily remissions. (8) The great restlessness and the insomnia was also characteristic. (9) The spleen was definitely but only slightly enlarged as is often the case whilst the blood showed a slight leucocytosis (1,000) without any characteristic count. (10) Constipation. The only missing links, to render the diagnostic evidence fully complete, were (1) that of a tick having bitten the patient a few days previous to his attack and (2) evidence of the locality being definitely infected with endemic

tick typhus, though the evidence of a former case from this area makes it presumptive. The haematological findings and the immunological findings were also in harmony with tick typhus.

Differential clinical diagnosis of the rash and fever

1. *From mosquito-dengue.*—As noted above dengue was considered at first the probable diagnosis but the continuation of the fever beyond 7 days, its gradual mode of onset and its termination by lysis, and the profuse distribution of the rash with the absence of a dengue epidemic negated this diagnosis.

2. *From measles.*—The rash in places was not unlike a measles rash but in measles the morbilliform eruption constantly appears about the brow and behind the ears at the hair line on the fourth day and disappears in three or four days. The fever lasts only seven days or so.

3. *From cerebrospinal fever.*—The febrile onset is usually sudden. The headache is often occipital with neck pains, stiffness and the presence of Kernig's sign. Vomiting is often frequent. The rose spots appear over the trunk and limbs during the first week. Leucocytosis is considerable (about 30,000) and lumbar puncture is distinctive.

4. *From louse typhus.*—Louse typhus, of which I have seen epidemics in Mesopotamia and on the N.W. Frontier, is a far more serious disease, in which severe toxæmia with the presence of nervous symptoms, i.e., the blunting of the mental faculties with the great muscular prostration of the 'typhoid state' (resembling a drunken-alcoholic), is marked from the onset. The prostration is early and pronounced even during the first two or three days of the disease as compared with the corresponding toxic 'typhoid state' often seen after some ten days in severe typhoid infection. Louse typhus is also a more acute disease typically with a sudden onset and a sudden termination by crisis after some 14 days of fever. The mortality in louse typhus is high (about 15 per cent), in tick typhus it is low (5 per cent or below). Moreover epidemiologically louse typhus is a disease of dirt, famine and overcrowding, is readily conveyed from person to person and occurs in epidemics at the height of the cold weather. Attendants are readily infected. The rash appears very constantly on the fifth day, and is less conspicuous, with the palms, soles and face usually unaffected. Megaw states that the staining at the site of the spots clears rapidly and does not last for several weeks as with tick typhus.

5. *From mite typhus.*—There was no local sore or ulcer, with enlarged secondary glands indicating a bite.

6. *From typhoid fever.*—Clinically, if the case had been one of typhoid or of paratyphoid infection then the infection could only have been a mild one because of the absence of toxæmia, together with a remittent-intermittent type of temperature coupled with constipation rather than diarrhoea. But the profuse rash appearing on the third day was quite unlike typhoid and could only be explained by the coexistence of a second disease. Moreover, instead of leucopenia the total white count showed a feeble leucocytosis. Blood and clot cultures for *B. typhosus* were negative. The urine which had been cultured on the 3rd November and between the 7th and 22nd November on nine separate occasions remained sterile to *B. typhosus*. The stools also had been thrice negative to *B. typhosus*. The culture on the 7th, 22nd and 24th November. The agglutination reaction which rose from presumably 1/50 positive to 1/833 positive on the 21st day was the one evidence for *B. typhosus* infection (*vide infra*). Apart from the clinical and bacteriological evidence such a rise would have been regarded as diagnostic.

7. *Secondary syphilide.*—The patient had obviously not been exposed to conscious specific infection, nor were his wife (her Wassermann reaction was negative) or children affected. Nor were local signs of an old

or of a recent chancre present. Nor were there any signs of a secondary specific lymphadenitis. The 21 days' febrile curve was unlike the slight evening rise sometimes seen in secondary syphilis. Moreover the fact that the rash appeared on the second or third day of the disease and disappeared with the fall of the fever indicated that it was caused by the active infection from which the patient was suffering.

8. *Sweat rash*.—The patient's skin was dry. There was no musty smell of sweat. No sudamina were present. The distribution was not mainly in those areas which sweated most, e.g., the rash affected the hands, feet and face very obviously.

9. *Prickly heat*.—The body rash was not unlike prickly heat but was associated with a very definite febrile illness and did not come on in the hot season.

III. THE IMMUNE RESPONSES DEMONSTRATED IN THIS CASE AND BY THE TYPHUS FEVER GROUP AS A WHOLE

The antibody reactions demonstrated in the case described above were protean and curious. The clinical diagnosis of the case was rendered of increased scientific interest, if not of temporary perplexity, by the positive Wassermann, the positive Widal in high dilution, the positive Wilson-Weil-Felix reaction also in high dilution, and the high opsonic index which were successively demonstrated. Moreover these usually specific reactions were not due to a specific immune response to an infection with their homologous antigens. The possibility of syphilitic and of typhoid infection were for instance definitely excluded. Such heterologous immune response has however come to be recognized as a characteristic of typhus serum and more especially against the proteus group of organisms. But this heterologous response of typhus serum is by no means restricted to the proteus group, for a positive Wassermann or a positive Widal is also well recognized as a possible fallacy in dealing with typhus serum. Indeed, the presence of this non-specific and easily demonstrable quality in typhus serum no doubt

1. *The Wassermann reaction*.—The following table shows the patient's Wassermann reaction results:

Date blood taken	31st Oct.	7th Nov.	14th Nov.	22nd Nov.	7th Dec.
Day of disease.	14	21	28	36	45
W.R. result	++±	++—	—	—	—

In the discussion under syphilis in the differential diagnosis of this case, the clinical reasons why syphilis could be definitely excluded in this patient were noted. The fact that the positive Wassermann cleared completely within seven days of the temperature becoming normal without antisyphilitic treatment indicated that, serologically too, the temporary positive Wassermann was not due to syphilitic infection.

It is indeed accepted that in louse typhus the Wassermann reaction is almost always positive before the crisis, but becomes once again negative during convalescence [Bauer (Price, 1933), and Taylor (1925)]. Negative Wassermann reaction reports in typhus may be due to the fact that the serum was taken after the temperature had reached normal.

2. *The Widal reaction*.—The patient was inoculated five years ago at the same time as his wife. Her residual agglutinins in November 1934 were *B. typhosus* 1/50, *B. para A* 1/50, *B. para B* 1/25. In the following table 'M.C.' stands for Medical College and 'C.R.I.' stands for the Central Research Institute, Kasauli. The titre noted are the positive end-points found. In the Medical College Laboratory agglutinable suspensions made from Kasauli strains were solely used for this series of typhoid tests except from 24th November when Oxford suspensions were also put up.

Date blood taken.	26th Oct.	31st Oct.	7th Nov.	10th Nov.	17th Nov.	24th Nov.			7th Dec.			20th Dec.		
Day of disease.	9	14	21	24	31	38			45			58		
Laboratory	M.C.	M.C.	M.C.	C.R.I.	M.C.	M.C. (Oxford)	M.C.	C.R.I.	M.C.	M.C. (Oxford)	C.R.I.	M.C.	M.C. (Oxford)	C.R.I.
<i>B. typhosus</i> 'H'.	1/25	1/350	1/833	1/250	1/125	1/250	1/125	1/125	1/50	1/125	1/50	1/50	1/125	1/50
<i>B. para A</i>	1/25	1/50	1/125	1/25	1/25	1/25	1/25	0	0	0	0	1/25	1/25	0
<i>B. para B</i>	1/50	1/50	1/125	1/50	1/25	1/125	1/25	1/50	1/50	1/50	0	1/50	1/125	1/50

explains the ease with which investigators have shown a positive agglutination to the several organisms which they have at one time or another proclaimed as being the causative germ of typhus infection. We are led indeed to conclude that the typhus toxin has this rare characteristic, namely that it stimulates widely and indiscriminately, and non-specifically, those tissues in the body which are usually concerned with the production of specific antibodies. Thus we can formulate a working hypothesis of the otherwise strange reactions which are found in practice in dealing with typhus fever serum. The serological reactions found in the case described above will now be detailed.

Clinically, the case was not one of typhoid fever. The bacteriological evidence also strongly supported this conclusion. And yet this remarkable rise in the typhoid agglutinins to 1/833 took place without a comparable rise in A and B agglutinins. Such a rise, except in typhus, would have been regarded as specific and as diagnostic of infection with *B. typhosus*. It is however of interest to note that the above rise to 1/833 on the 7th November affected typhoid H-agglutinins only that the Widal against typhoid O-agglutinins (an alcoholized suspension of a Kasauli culture being used) on this date and again on the 7th and on 20th December proved entirely negative.

It is well recognized that the Widal may be positive in typhus infection. Wilson in Muir and Ritchie (1932) originally noted this positive reaction. So also Megaw (1930) and Manson (1929). And such false positives have been the cause in the past of tick typhus cases being diagnosed as typhoid infections.

3. *The Wilson-Weil-Felix reaction.*—The following table sets out the patient's results. The titre on 31st October and 17th November was not end-point. One unexplained peculiarity about this reaction is its dependence on O antigen, wherefore formalized or phenol suspensions should not be used, and living suspensions, from a reliable strain, should be incubated with the patient's serum at 31°C. and not at 55°C. Neglect of these precautions have produced anomalous results.

Wilson-Weil-Felix reaction

Date blood taken.	31st Oct.	7th Nov.	10th Nov.	24th Nov.		7th Dec.			20th Dec.		
Day of disease	14	21	24	38		45			58		
Laboratory ..	C.R.I.	M.C.	C.R.I.	M.C. (Living)	C.R.I.	M.C. (Living)	M.C. (Oxford)	C.R.I.	M.C. (Living)	M.C. (Oxford)	C.R.I.
Proteus X 19	1/250	1/250	1/2,500	1/1,250	1/2,500	1/500	1/250	1/1,000	1/250	1/250	1/500
Proteus (K)	1/50	..	1/25	1/25	1/25	1/50	..	0	1/50	..	1/25
Proteus 2 ..	..	..	1/25	1/50	0	1/50	..	0	1/50	..	0

Our patient therefore showed a very marked reaction to proteus X 19 which reached 1/25,000 between the 24th and 31st days. In louse typhus the Wilson-Weil-Felix reaction is generally recognized as being very reliable.* But the agglutination of *B. proteus* organisms with sera of the various varieties of typhus cases throughout the world have shown most anomalous results. The rule of thumb is that agglutination to X 19 is usually positive in high dilutions to louse typhus. In mite typhus it is negative whilst in tick typhus it may be positive.

Though in tick typhus the Wilson-Weil-Felix reaction has usually been reported negative yet in some outbreaks and cases, as in that reported above, it has been found positive. The Central Research Institute, Kasauli, however had several tick typhus cases in 1934 from the Simla Hills, most of which agglutinate Kingsbury strains, but some show a very high titre against X 19. One case amongst their own European staff showed a positive X 19 of 1/10,000. Thus this reaction cannot be relied upon as a point of distinction between louse, tick and mite typhus, in spite of the dogmatic claims that are at times made. For instance one famous textbook states 'The rural type of Malay typhus is negative to X 19, but positive to the Kingsbury strain, whilst in Indian tick typhus, neither the Kingsbury strain nor the original X 19 is agglutinated' (Muir and Ritchie, 1932). In actual fact, the Weil-Felix reaction is not really important in practical diagnosis, for the diagnosis is usually clear before the reaction can be carried out under proper conditions and becomes positive.

* The typhus commission found that in louse typhus reactions of 1/100 are almost diagnostic but in many cases positive reactions of 1/1,000 to 1/10,000 existed by the 14th day. The reaction appears about the 4th or 5th day in 50 per cent of cases, attains its height during the second week (when practically all cases are positive) and returns to negative in from six weeks to three months after the onset of the illness. Control reactions in other diseases do not exceed 1/50.

4. *The opsonic index.*—On the 10th November, i.e., on the 24th day of the disease and five days after the patient's temperature had reached and remained at normal, his blood serum showed an opsonic index of 4.6 to *Staphylococcus aureus*. On the 20th December, this had fallen to 1.25.

5. *Other agglutination reactions, etc.*—Agglutination reactions to *B. abortus* and to *B. coli communis* were negative on the 10th December, also to *M. melitensis* on 7th and again on 20th December. On the 7th December the agglutinins to *B. coli communis* and to *B. coli communior* were both 1/25 positive. The aldehyde test was also negative on this date. Olitsky in 1921 stated that antibodies are formed in the blood of typhus patients not only against the proteus group but sometimes against *B. pyocyaneus*, *melitensis* and

the typhoid bacillus. There is a marked tendency for typhus serum to develop heterologous antibodies as in my case which developed such for *Treponema pallida*, for *B. typhosus*, for *B. proteus* X 19 and for *Staphylococcus aureus*. Doubtless many other heterologous antibodies unsuspected and untested for were also so developed and such if tested for during the course of the fever would have been successfully demonstrated. This peculiar reaction of typhus serum to a range of organisms deserves fuller investigation.

6. *Intraperitoneal guinea-pig inoculation.*—On the 31st October (being the 14th day of the disease) and when the patient's fever was at its highest, four ounces of his blood were injected intraperitoneally into a male guinea-pig weighing 510 grammes. After losing 70 grammes in the first three days the guinea-pig remained well at a constant weight of 460 grammes. There was no fever and no testicular swelling.

After the chimpanzee and monkey, the guinea-pig is the most susceptible experimental animal to the typhus virus. In the guinea-pig after a 10 days' incubation a non-fatal febrile illness of some 10 days' duration develops, characterized by wasting, effusion into the tunica vaginalis with ear rash and swelling. In Indian tick typhus such inoculations have failed whilst in European, Mexican, and Rocky Mountain fever the guinea-pig is reported commonly to contract the infection.

My thanks are due to Dr. S. P. Gupta, Lecturer in Pathology, for the interest he took in the agglutination findings which are entirely his own work. Also to the Central Research Institute, Kasauli, who kindly undertook their parallel agglutination observations from the same serum, taken on the same dates.

APPENDIX

The first two cases of tick typhus recognized at King George's Medical College and in India, both by Major Megaw, I.M.S., are outlined below:

Case 1.—(From the I. M. G. of January 1917 and of October 1921.) A healthy European of 42 years, on

1st July, 1916, whilst staying at Bhowali about two miles from Sat Tal, found a tick firmly fastened to his neck. The tick was not identified but it was considered that it might be *Rhipicephalus sanguineus* or *Hyalomma aegyptium*. On the 21st July a twelve days' fever started. The symptoms were malaise and orbital headache, with some pain in the back muscles which caused disturbed sleep for two or three nights. On the fifth day a diffuse macular erythema was noticed all over the body including the palms, soles and face. In two further days the eruption was maximal, the colour changed to brownish-red whilst about the eighth day the spots had a distinct tendency to become petechial. The eruption faded rapidly with the fall of the temperature but a brown staining at the site of the spots was visible for about five weeks afterwards. The spots were roughly circular in shape and varied from three to seven millimetres in diameter; at first they faded on pressure. The patient was not toxic and rose from his bed the day on which the fever reached normal. Widal reactions to *B. typhosus* and *paratyphosus* on the ninth and eleventh days were negative. Blood culture on the 9th day was negative, and subcutaneous inoculation of one-half c.cm. of blood into a monkey on the eleventh day gave negative results. The total leucocytes on the eleventh day were 15,400 and an average count was polymorphonuclears 68 per cent, small mononuclears 25 per cent, large mononuclears 6 per cent and eosinophiles 1 per cent. The abundant rash, the negative Widal and definite leucocytosis excluded the typhoid group.

Case 2.—(From King George's Hospital Medical Case Sheets of October 1917.) G. L., a Hindu of 38 years, was admitted on 30th October, 1917, into King George's Hospital under Major Megaw—complaining of (1) fever, (2) joint pains (both for 10 days) and (3) constipation (2 days).

Patient was a forest officer, who had been working in the Hamirpur District of the Jhansi Division at Kunehta Forest seven miles from Maudaka since July. He resided in a bungalow half a mile from the village. The area was a damp jungle place, with many cattle but little cultivation. He did not recognize the presence of ticks but was much troubled from the bites of many insects before the fever began. On 22nd October, the fever started with a slight chill and continued in an increasing degree every day, the temperature in the evening becoming high and decreasing in the morning. Pain was present in all the joints. On 30th October, the day of admission, the patient was very weak, so that he was unable to give a very accurate history. For the past two days he suffered from severe headache, mental depression and constipation. He had slight toxæmia. The whole body except the palms, soles of the feet and the face was covered with a spotty rash each spot of which was rose-red in colour, fading on pressure, and about the size of a mustard grain. The spots do not vary in size. Its intensity was most marked on the extensor surfaces of the extremities but widely diffused over the trunk. The alimentary, circulatory, respiratory and urinary systems were normal. The total white count was 14,000 and the differential showed polymorphonuclears 73 per cent, lymphocytes 20 per cent and large mononuclears 7 per cent. The Widal against typhoid and paratyphoids A and B was negative in all dilutions.

On 2nd November the rash was noted as subsiding and becoming pigmented. On 11th November, being the 21st day of the fever, the temperature reached normal for the first time and remained thereat throughout the patient's convalescence.

SUMMARY

1. Three cases of tick typhus have been recognized at King George's Medical College, Lucknow. The first two cases (summarized in the appendix) were also the first described in India, and formed the

foundations of our present knowledge of this type of typhus infection.

2. Historically, the first step towards this knowledge was McKechnie's observation in 1913 that the endemic continued fever of Bhim Tal was not a typhoid group fever but was a subvirulent non-epidemic typhus infection, unassociated with the usual typhus epidemiological conditions of poverty, famine, overcrowding, dirt and lice.

3. The second step was Megaw's observation in 1916 that a case of Bhim Tal fever apparently followed a tick bite, together with his explanation that the sporadic distribution of tick typhus was due to the exposure of individuals, living a camp life in the open jungle, to bites from ticks; which had themselves become infected from jungle rodents.

4. The third step was the recognition that heterologous serological reactions are not unusual in typhus serum which observation was so clearly proved in the third case of tick typhus diagnosed at King George's Hospital in 1934.

5. The clinical features of this third case are fully described and leave no room for doubt as to the correct clinical diagnosis.

6. The serological reactions of the third case showed (1) a Wassermann reaction which was positive (+ + ±) during the continuation of the fever and became negative when the temperature reached normal, (2) a Widal reaction positive to *B. typhosus* in a dilution of 1/833, (3) a Wilson-Weil-Felix reaction positive to *B. proteus* X 19 (1/2,500), (4) a high opsonic index to *Staphylococcus aureus* (4.6), and (5) some increase in the total white leucocyte count, all of which fell to approximately normal within a month or two of convalescence. Such reactions in this case were not due to syphilis or to typhoid infection, for both diseases were definitely excluded both clinically and also by a complete series of laboratory tests.

7. But positive Wassermann reactions, positive agglutination reactions to *B. typhosus* and to *B. proteus* X 19 have been frequently reported in individual cases and groups of typhus infection. In louse typhus, a positive Wassermann during the fever is commonly present. A positive Widal to the typhoid group has often obscured a real diagnosis of typhus. Whilst the positive agglutination of *B. proteus* X 19 frequently found in typhus serum formerly led to the belief that typhus infection might be due to a parasitic phase of *B. proteus*.

8. Thus the deduction is reached that typhus toxin has the peculiar property of stimulating intensely but non-specifically varied antibody producing (hæmopoietic) tissues. Further, typhus serum may show individual or multiple non-specific serological reactions, which are ordinarily considered individually specific to, and diagnostic of, their respective infections.

9. Apart from Bhim Tal and Sat Tal, a second endemic area probably exists near the Kunehta Forest in the Hamirpur District of the Jhansi Division, for the second and third cases both contracted their infection in this same area. The second case was a forest officer, who had been camping in this area for three months previous to his attack. The third case was an American missionary who had also been camping for a month previous to the onset of his fever within some seven miles of the second case's original camp. Both cases developed a similar atoxic mild fever lasting in each case for 21 days, with a similar diffuse roseolar-macular body and limb rash and being contracted in both cases at the end of the hot weather in October. This possible endemic area is being further investigated.

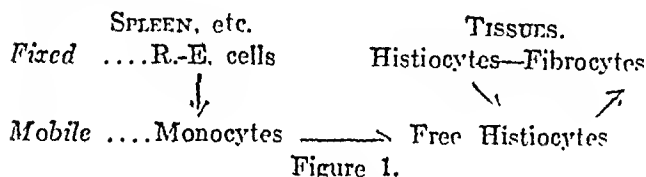
8. There was also evidence of the development of some slight agglutination against *B. para A*, *B. para B*, *B. proteus K*, *B. proteus 2*, *B. coli communis* and *B. coli communior* for a few days during the patient's infection. No agglutinins were noted against

(2) In the reticulum of the spleen and lymph nodes, where they form a great network through which the blood or lymph slowly percolates. These cells are provided with long filaments, which intermesh and form the reticulum or splenic pulp.

(3) Along the lining of specialized venous sinuses in the spleen, bone marrow and liver. In the liver the cells are called Kupffer cells and line the liver sinusoids.

(4) Within the splenic network, caught, as it were, in the meshes, where they are termed splenic cells. These cells are intimately bound up in the production of the mobile element of the system, which is resident in the blood and there helps to swell the number of white cells under the name of 'monocytes'.

Several suggestions have been made as to the origin and inter-relationship of these cells, and although there is some agreement in the suggested theories, by no means all the authors conform to any generalized plan. Figure 1, however, gives briefly the essentials, namely, that the reticulo-endothelial system in the spleen, etc., form the monocyte by division, and that the free histiocyte of inflammatory lesions comes from both fixed histiocytes and monocytes which have migrated to the lesion from the blood. The fibrocyte or cell of the fibrous tissue is formed from these free and fixed histiocytes.



From this description it can readily be seen that the cardinal feature of the structure of the reticulo-endothelial system lies in its diffuseness; it permeates the whole body, and is ready, in fact, to deal with any foreign matter which may present itself.

On the other hand, its chief physiological characteristic is ingestion, or phagocytosis, and this action, combined with intra-cellular digestion, lies at the bottom of any function which may be attributed to the system. In many ways the amoeba likens itself to a reticulo-endothelial cell, for if, in its passage across the bottom of a stagnant pond, the amoeba encounters a smaller animal or other particle of food, it surrounds it with a pseudopodium, and allows it to pass through the limiting cell membrane. Once inside it is digested and disappears into the general cytoplasm. The difference, however, between a reticulo-endothelial cell and an amoeba is that the latter ingests only food substances, whereas the reticulo-endothelial cell ingests any particulate matter which is presented to it. The system is, then, a scavenging system ready to clear the blood and tissues of any debris or noxious material which might hinder the function of the cells.

In view of this phenomenon of ingestion, it is not surprising that several important phagocytic functions have been attributed to the system. When a tadpole becomes a frog it loses its tail, and this is brought about by the phagocytes actively ingesting them, and liberating the products of digestion into the blood to be dealt with elsewhere. Similarly, phagocytosis takes place around the ends of any growing long bone of the skeleton, for since the end of the bone is wider than the adult shaft, it is clear that some bone must have been absorbed, because it was all originally produced from the same epiphyseal cartilage. Another instance of phagocytosis is the removal of the distal portion of a severed nerve fibre. As the axis cylinder breaks up the local reticulo-endothelial cells help the neurilemma cells in removing the debris and myelin of the sheath. They thus leave a pathway clear down which the new cylinder may grow. As stated above, the system may phagocytose colloidal dye—in fact, any

matter which is not in solution and is floating about in the blood and tissues is liable to be absorbed by these scavenger cells. If a tissue is damaged in any way, then it will be cleared of debris and dead tissue by the reticulo-endothelial cells. On the property of dye absorption depends the process of 'blocking'. The process is used to eliminate as far as possible the effects of the reticulo-endothelial function, and depends upon the fact that so much dye may be absorbed into the cells that they become quite useless for further processes, and this measure, combined with splenectomy, is largely used in determining what part the reticulo-endothelial system plays in any particular process.

A process which has now been attributed to the reticulo-endothelial system is that of the breakdown of hæmoglobin to form the green pigment of the bile—bilirubin.

For many years it has been known that bilirubin was one of the products of hæmoglobin breakdown, and since the bile was excreted by the bile duct it was legitimately supposed that the liver cell was the site of this transformation. The only contradictory evidence to this theory, moreover, was the fact that if blood was forced into the tissue spaces, as in a bruise or black eye, a pigment was formed during the breakdown of hæmoglobin, which resembled bilirubin very closely. This theory had for its support the classic experiments of Minkowski. He took some geese and, cutting out their livers, injected a solution of hæmoglobin into their circulation, and thereon, finding that no bilirubin was produced, concluded that the site of its production, and therefore of the breakdown of hæmoglobin, was the liver cell.

However, it was soon found that bilirubin was present in human blood serum, which, of course, would be impossible if the liver were the only site of its formation, and this stimulated McNee in 1913 to repeat Minkowski's experiments. At first he obtained the same results, but when he used dogs instead of geese, he found that he could find bilirubin in the blood, even after complete liver removal. But, unfortunately, this did not satisfy everybody, for it was suggested that McNee's bilirubin was reabsorbed from the alimentary tract, and it was not until Mann in 1924 removed both liver and alimentary tract *in toto* and still was able to obtain the pigment in the blood that the extrahepatic formation of bilirubin was validated.

The available evidence then began to point to the reticulo-endothelial system as the site of hæmoglobin breakdown. It was possible, of course, that the breakdown occurred in the blood, but that was eliminated by perfusing an ordinary 'heart-lung preparation' with hæmolyzed blood and failing to obtain bilirubin.

Rich found that he was able to grow reticulo-endothelial cells in culture tubes, and that these cells broke up the hæmoglobin that he presented to them. It was also found that if the reticulo-endothelial system was 'blocked', bilirubin could not be formed in the circulation.

But the most conclusive evidence of all is that, if the bilirubin content of the artery and vein supplying an organ are compared by the van den Bergh reaction, it is found that in the vein leaving an organ rich in reticulo-endothelial cells there is a marked bilirubin increase, and further, the reticulo-endothelial cells can be shown histo-chemically to contain the bilirubin in crystalline form, before it is liberated into the blood stream.

It may be seen why Minkowski's experiments on the goose were so misleading, because in these animals the liver contains not only liver cells, but also all the reticulo-endothelial system as well. Further, it is now clear why a bruise should break down to form bilirubin in the tissue spaces, for there lie the histiocytes, ready to break up any extravasated hæmoglobin

and repair any damaged tissues, which its presence may have caused.

The next interesting function of the reticulo-endothelial system is the part it plays in fighting infection by a micro-organism.

The body defends itself from invasion by micro-organisms with three barriers:—

1. The intact skin, and mucous membranes. This is a very important barrier, but the reticulo-endothelial system plays no part in its maintenance.

2. The tissue fluids. These consist of the blood and lymph, and in them are the various antibodies of the body.

3. The reticulo-endothelial cells.

These last two defence mechanisms are responsible for the phenomenon of immunity, which consists in the host becoming more sensitive to the presence of the invader, and being able to eliminate him the more easily. The body of the host does this in two ways:—

(a) By producing antibodies in the tissue fluids which kill the organism and neutralize its irritating toxins; and

(b) By increasing the power of the reticulo-endothelial phagocytosis to a remarkable extent. Although these mechanisms work well in the ordinary host, the production of immunity is the sensitization and speeding up of these bodily processes.

When the organism has passed barrier one, the intact skin, it may be eliminated in one of two situations: either in the tissue spaces, where an abscess is probably formed, or in the blood stream and reticulo-endothelial system elsewhere.

In local infections the reticulo-endothelial system can actually be watched going about its business, when an infected web of a frog's foot is placed under the microscope. Vessels are seen to dilate, and white cells of the blood migrate fast to the site of the infection. However, at first polymorphonuclear cells only, which are not members of the reticulo-endothelial system, attack the organism. The latter, when many are dead and pus is beginning to form, the histiocytes and monocytes enter the battle and phagocytose not only the remaining unkilld organisms, but also all the dead polymorphs and debris of the damaged tissue. Their job is, therefore, to make way for a reconstruction, which is undertaken by the fibrocyte and is in the nature of a formation of fibrous tissue to bind the sides of the cavity, so formed, together. The whole process of local inflammation may also be watched in exudates in the peritoneal cavity, and if the reticulo-endothelial cells have been vitally stained beforehand the part played by the system can easily be assessed to be one of reconstruction.

In general infections or infections which have reached the blood stream the part played by the reticulo-endothelial system is mainly determined by 'blockage' methods. For instance, it was found that in animals previously 'blocked' and having undergone splenectomy infections became both more virulent and more rapidly fatal. This is true of bacteria, spirochaetes, or even viruses. In similar animals it was found possible to infect them with a species of organism to which the normal animal was naturally resistant, and it seems that natural resistance is an enormous power of phagocytosis, which the animal exhibits towards the particular organism, for instance the frog to the pneumococcus and the hen to bacillus anthrax.

Further, if an immunized animal was taken, it was found that by splenectomy and 'blockage', immunity could be broken, and the animal became as susceptible to infection as a normal animal. Outside the evidence of 'blockage' is still the fact that bacteria can be demonstrated in the reticulo-endothelial cells in the process of being digested during an infection, and these

cells are found to be able to absorb remarkable numbers in the immunized animal.

Some say that the tissue fluids alone are responsible for immunity, but this theory may be disposed of on the grounds that if an immunized animal is taken and its whole blood volume changed with that of another non-immunized animal, immunity still persists, showing that it is cellular in nature and only helped by the humoral mechanisms in the tissue fluids.

In specific infections, such as syphilis or tuberculosis, the part played by the reticulo-endothelial system in the untreated disease is mainly one of phagocytosis of the causative organisms, and the reticulo-endothelial reaction is more predominant by far than in the ordinary pyogenic infections, where the polymorphonuclear response is the rule. But if the disease is treated, it seems that the system plays a large part in the accentuation of the drug that is given. For instance, when arsenical compounds, such as neosalvarsan, are used in the treatment of syphilis, it appears that they are rapidly absorbed by the reticulo-endothelial system, and then slowly liberated again when the organism comes within reach. This opinion is held because if neosalvarsan is used against the organism in culture tubes, very little effect is produced, and further, that if the system is 'blocked' with dye, the neosalvarsan remains in the blood, and is quickly eliminated by the liver and kidneys before producing the required results. In fact, for the drug to be effective in killing the spirochaete the defence mechanisms of the body must be available. The sanocrysin given for tuberculosis acts in a similar way, but since this compound is colloidal in nature it probably stimulates the reticulo-endothelial cells to greater phagocytic action, for small amounts of any colloid stimulate reticulo-endothelial tissue. The mode of action of sanocrysin is particularly interesting because it may be possible to find drugs which can stimulate reticulo-endothelial cells in a great many more clinical conditions, and modern therapeutics is tending more and more towards stimulating reticulo-endothelial tissue.

The problem concerning the site of production of barrier two of the antibodies in the blood is much discussed. The obvious theory is that they are produced by barrier three of the reticulo-endothelial cells, but the evidence for this is of the flimsiest. Since the bacteria are taken up by the reticulo-endothelial cells it might be supposed that from the protein of their carcasses, so to speak, antibodies would be produced, but the results of 'blocking' the reticulo-endothelial system are most disappointing, and it cannot be said definitely that this is so. The other piece of evidence in favour of this theory is the fact that if the reticulo-endothelial cells are grown in jelly they can be made to form antibodies, but the results of any culture experiments must be very carefully accepted because the surface of an agar slope is scarcely homologous with the complicated environment within the human body.

However, modern belief tends towards the theory that the reticulo-endothelial system is both responsible for the cellular defence, or third barrier of the body, and the humoral, or second barrier of the body, which comprises the tissue fluids and the antibodies within them.

Metehrihion has recently made some wonderful experiments to show that this phenomenon of immunity, which is equivalent to sensitization of the body, may be synonymous with sensitization of the central nervous system. He has taken an earthworm and, finding that it will develop an immunity to cholera vibrio, has destroyed its third segmental ganglion, when he found that it was then impossible to produce immunity. If, however, he destroyed any other ganglion, the production of immunity was still possible, and thus he associates the production of immunity with the third segmental ganglion in the worm.

Further, he has tied a ligature round the centre of a worm so that only the nerve cord remains, but the blood supply was cut off, thus leaving the two halves united solely by the cord. Then, on immunizing the back half of the worm, he found that immunity also developed in the front half, and concluded that the cord had been the means of its transference. But the most conclusive evidence of all his experiments is that on the rabbit. He immunized this animal to cholera by a series of injections of dead vibrio, which he associated in the animal's mind with the ringing of a bell after the style of the conditioned reflexes of Pavlov, and when immunity was at its height, he waited three weeks and allowed it to fall to a normal level. He then commenced to ring the bell alone at regular intervals, and found, to his delight, that the immunity rose again to a high level, thus showing immunity to be a sensitization of the central nervous system, which could be called out at any time to a proper stimulus. The inference must be drawn, then, that the reticulo-endothelial system, although so diffuse, is probably controlled by a nervous or hormonal mechanism.

Lastly, there is the function of controlling the growth of neoplasms, and, more particularly, cancers.

Since cancer is a new formation of tissue, it might be thought obvious that the reticulo-endothelial system could be responsible for its control and possible removal; but that is by no means the case, and the theory of the reticulo-endothelial control is now advanced tentatively on but small grounds.

The spleen seems to be the chief source of tumour resistance, because malignant growths rarely set up secondaries there, and Beuda suggests that this organ gives out a positive substance, for she finds that when the spleen is removed, tumours become more easily transplanted and grow more quickly.

Further, it has been discovered that if tumour cells are planted into an animal along with the splenic cells, no growth is formed, and that if a mouse is 'blocked' with dye, it becomes more susceptible to a tumour to which it was before insusceptible.

Other evidence is largely circumstantial. For instance, tarring the skin is known to produce new growths, and it is also known to damage the local reticulo-endothelial cells considerably. Also the emanation of radium is known to produce tumours, as are also x-rays, and both these emanations are known to weaken the reticulo-endothelial system considerably. The aim, therefore, in therapeutics with these two radiations must rather be to give very small doses to stimulate the reticulo-endothelial cells than to give larger doses in order to kill the tumour cells and damage irreparably the reticulo-endothelial system. The clinical evidence, however, is still lacking, for no records have as yet been made as to the state of the reticulo-endothelial system in cancer patients, and, indeed, only a few tests as to the state of the reticulo-endothelial system efficiency exist, and until this is done the part played by the system in the cure of cancer must remain *sub judice*.

Conclusion

Pathologically, then, the reticulo-endothelial system plays a large part in the control of disease, and the tendency of modern therapeutics should be towards improvement in its efficiency rather than towards eliminating the invader by more direct methods. Prophylaxis means a good reticulo-endothelial mechanism, and lucky is he who has such a system, for if, for any reason, it should fail, it would be bad for him.

Physiologically, however, the system is the example *par excellence* of the motto which is engraved upon the heart of all good physiologists, 'Function Determines Structure'.

The Necessity for the Standardization of the Treatment of Bacilluria

By A. M. CRANCE, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. CIV, 26th January, 1935, p. 285)

CONSIDERING the fact that modern urology has in general made great strides forward during the past two decades, there is still a wide discrepancy within the profession regarding the management of urinary infections, particularly those infections which are due to the *colon bacillus* group. This discrepancy should actually not exist. Its remedy is obtainable only by effecting some definite standardization in the management of bacilluria in general. My purpose in this paper, therefore, is to summarize briefly the reasons why such a therapeutic standardization is possible as well as advisable.

Needless to say, it has apparently not yet been learned that there is no urinary antiseptic which eliminates the *colon bacillus* from the urinary tract. Drugs, therefore, are of little value in treating this infection.

It must furthermore be borne in mind that urinary infections due to *B. coli* rarely ever disappear spontaneously. It was only a few years ago that one of the great urologists said that, in his opinion, when a patient develops *colon bacillus* infection in the kidneys he is bound to go to his grave with the kidneys still infected. To-day, since advances in the management of bacilluria have become so obvious, this statement is decidedly out of order. Approximately 80 per cent of *colon bacillus* infections in the urinary tract can be completely eliminated by conscientious, practical methods of therapy.

In 1924 a small series of cases was reported in which complete recovery occurred by the use of autogenous vaccine, given in rather large doses at five-day intervals over a period of from eight to twelve weeks. Many physicians have little use for vaccines, I am not an exception to this belief. However, so far as *B. coli* infections are concerned, it is perhaps one of the most valuable aids to date.

Continuing to work out more effective measures, because it was obvious that not every case would respond to one form of treatment alone, I began to wonder why nearly all these cases showed infection in one or both kidneys. In fact, all cases were thoroughly studied on the cystoscopic table, and in more than 90 per cent the infection was found to originate above the bladder. Why should this be true? Why also did so many of these cases give histories of chronic constipation, or in fact some intestinal upset, such as diarrhoea, prior to the appearance of cystitis symptoms? The reason is, I believe, that the *colon bacillus*, whose natural habitat is in the colon, is by virtue of its increase in numbers politely invited to seek a new residence and, by gaining entrance to the lymphatic system, finds its way to the kidney, where it is known to become a pathogenic, pus-producing organism. With this theory firmly in mind, the treatment then became more of a matter of treating the colon, the focus of infection. It is quite evident that if the number of *B. coli* in the intestinal tract can be reduced to somewhere near normal, the organisms will cease leaving it to go elsewhere.

Three methods may be used, and in fact all three methods should be used, in attacking the problem of correcting the focus: first, by daily enemas; second, by changing the intestinal flora each two weeks with a sudden change in diet—i.e., two weeks high protein, two weeks high fat, and two weeks high carbohydrate; third, by the daily use of a good acidophilus preparation, preferably not in milk. These, together with the aforementioned autogenous vaccine, constitute four important measures, which I have termed the 'four-point treatment'. As reported in 1923, it gave 80 per cent satisfactory results, and this percentage has

remained the same. This method of treatment was used long before the various types of the colon group were differentiated.

TYPES OF BACILLURIA

Bacillus coli constitute approximately 80 per cent of all urinary infections, excluding of course the gonococcus. To-day it is definitely known that two distinctly separate types of *B. coli* exist; namely, the *Escherichia* and the *aerogenes* varieties. These constitute nearly all the cases of bacilluria. Others, which occur far less frequently, are *Pseudomonas* (*B. pyocyaneus*) and *B. proteus*.

Of chief concern in this paper is the management of the *B. coli* group. First of all, it must be borne in mind that this discussion does not deal with cases presenting surgical complications, such as perinephric abscess or surgical pyonephrosis but rather it is to deal with the type of case in which treatment is considered medical in character.

IMPORTANCE OF DIAGNOSIS

Diagnosis is of primary importance. Samples of urine for culture should always be collected by catheter in the female, and in the male by careful cleansing of the meatus prior to voiding in a sterile container. Cultures will show practically all types of bacillus infections and the coccus group such as staphylococci and streptococci, tubercle bacilli excepted. When *B. coli* is found, usually in pure culture, the laboratory should go further and subculture the specimen to determine which type is present. A very simple method may be used for determining this. *Aerogenes* produces gas within forty-eight hours in saccharose, whereas *Escherichia* does not. Both types form gas in lactose. It is very important, as I will try to point out, to know which type is present before any outline of treatment is attempted. As already stated, I have obtained approximately 80 per cent successful results in the treatment of *B. coli* infections during the past ten years by the so-called four-point treatment. This method yields results in the *aerogenes* type practically as well as it does in the *Escherichia* variety.

Clark, formerly of the Mayo Clinic, and also Helmholtz have shown in several recent reports that about four out of five patients presenting infection with *Escherichia coli* will completely recover by the ketogenic diet treatment. During the past two years, I have been able to obtain approximately the same percentage of recoveries in this type, using the ketogenic regimen. The principle of the ketogenic treatment probably needs little explanation, excepting that the work of Fuller of England has shown that a specific agent (1-B-hydroxybutyric acid) is produced in a ketone urine and that this agent destroys the colon organism. A recent editorial in *J. A. M. A.* also reviewed in an interesting manner the action of this specific agent. The diet also strives to yield a urine with a pH somewhere below 5.1. Colon bacilli are destroyed in an acidity of from 5.1 to 4.6. (Normal urine averages approximately from 6.8 to 5.8.) Clark also obtained satisfactory results in seven out of twenty-one cases presenting the *aerogenes* type. In ten cases of the *aerogenes* type that I treated, the ketogenic regimen failed in each instance. Therefore, with one worker showing only one out of three patients recovered, and another showing no recoveries, why should the ketogenic diet be considered as a method of choice in treating the *aerogenes* type?

This is exactly where the standardization of definite therapy enters the picture. Since the *Escherichia* type of *B. coli* responds to both the ketogenic regimen and the four-point treatment with approximately equally satisfactory results, one has the choice of either. The ketogenic diet is much the quicker method if it produces the result, from ten to twenty days usually being sufficient. Against the ketogenic diet is the fact that hospitalization is necessary, or at least the patient

must go to the hospital for meals, if the utmost co-operation is to be obtained. On the other hand, if the ketogenic treatment fails in this type, the other treatment may be resorted to. Conversely, patients failing to recover with the four-point treatment may completely recover under the ketogenic regimen. Generally speaking, therefore, in infections with *Escherichia coli* the ketogenic diet, when possible to carry out conveniently, is the method of choice. The other method can always be resorted to if necessary.

For reasons previously stated, the ketogenic diet, in my opinion, is not at all indicated in the *aerogenes* type of *Bacillus coli* infections. The percentage of successful results has been too low to warrant the advisability of submitting patients to the expense of hospitalization or dietary measures. The *aerogenes* type decidedly calls for the four-point treatment. My results with this type have been entirely satisfactory, and in fact I feel that the *aerogenes* type definitely contraindicates the use of the ketogenic regimen. It has occasionally been necessary to repeat the course of treatment; persistence, until complete recovery, is essential to its success.

Pseudomonas (*B. pyocyaneus*) infections respond exceptionally well to the ketogenic diet, as do the majority of the remaining types of organisms found less frequently in bacillurias. In the *pseudomonas* infections, Clark was able to obtain sterile urines from thirteen out of fourteen patients treated.

AUTHOR'S FOUR-POINT TREATMENT

1. Autogenous vaccine, made up 1,000 million per cubic centimetre, is given intragluteally at five-day intervals, beginning with 0.5 c.c. and increasing each subsequent dose by 0.5 c.c. until the dosage of 2 c.c. is reached. Usually a course of twelve injections is given.

2. Daily enemas are given. The soapsuds enema is used, the size being increased up to 2 to 2½ quarts. This portion of the treatment helps to eliminate an excess of colon bacilli from the intestinal tract, which is the focus of infection.

3. Previous work has shown that *Bacillus acidophilus* definitely aids in changing the intestinal flora and also that it aids the intestinal tract in its function of elimination. It is prescribed in liquid culture form because in milk it would interfere with the change in diet mentioned in the fourth item.

4. Two weeks of high protein diet, two weeks of high fat diet and two weeks of high carbohydrate are given for the purpose of changing the intestinal flora, which in turn decreases the number of colon bacilli in the colon. It is occasionally necessary to continue on with this diet if the urine still shows positive cultures at the end of the first six weeks.

Summary

The first remark should deal with the importance of bacilluria. Too often is this type of case 'passed up' as something inconsequential, to be treated only with urinary sedatives or the supposedly antiseptic preparations. Too often does the physician believe, because the symptoms subside under these remedies, that he has cured his patient. *B. coli* infections especially may subside sufficiently to warrant this belief. Actually, however, the infection goes on, and sooner or later a 'flare up' occurs, at which time it will erroneously be termed a 'recurrence'. It is not a recurrence in the true sense but rather an acute exacerbation, simply because the case was not carried along to complete recovery at the time of the previous treatment. A cure depends on three things—no more, no less. These are freedom from symptoms, a urine free from pus and an entire absence of bacilli on culture. The culture must be sterile.

Conclusions

The following conclusions are directed entirely to the standardization of the treatment of bacilluria.

1. The physician should have courage enough to discontinue the use of oral medication with urinary antiseptics. It has previously been proved that they will not yield a sterile culture of the urine.

2. *Bacillus coli* cultures must be subcultured, since the treatment depends on the type, whether *aerogenes* or *Escherichia*.

3. *Escherichia* infections heal very satisfactorily under the ketogenic diet in fully 80 per cent of the cases. When this fails, the four-point treatment is indicated. It is well to remember that the two treatments yield equally good results but that the ketogenic treatment is usually somewhat quicker in effecting a cure.

4. In the *aerogenes* type of *B. coli*, the four-point treatment appears to be by far the better method of attack. It will require from eight to twelve weeks of persistent effort, on the part both of the physician and of the patient.

5. *Pseudomonas*, and other less common types of bacilluria, apparently respond best to the ketogenic treatment.

6. The stubbornness of *B. coli* infections in general being realized, a complete cystoscopic study of each case, including differential function, elimination of ureteral strictures, and the like, should be made. Pathologic changes that will interfere with the treatment should be known in the beginning. It would seem more advisable for the physician to make such a study before treatment is instituted rather than to find out later why the treatment failed.

Dosage Above the Pharmacopœial Maximum

By ARTHUR F. HURST, M.D. (Oxon.), F.R.C.P. (Lond.)
(Abstracted from the *Lancet*, 22nd December, 1934, p. 1379)

THE dosage given in the B. P. represents the average dose given to adult patients. Experience shows that under certain conditions very much larger doses of certain drugs can be given with advantage. In some instances, as in the case of atropine, this is due to the great variations in individual susceptibility, the same therapeutic effect being obtained in a very susceptible individual with a dose which may be only a half or a quarter of the dose required for a patient who is unusually resistant to the action of the drug. In other cases recent therapeutical investigations have led to the discovery that a more powerful and sometimes quite different effect can be obtained with a dose much greater than that given in the B. P.; the larger dose has then generally to be administered with special precautions. In such cases it would only be safe to alter the official dosage if it were possible at the same time to add a note as to the method of administration.

IRON IN ANÆMIA

In spite of the large amount of work which has been done in recent years on the treatment of anæmia and the admirable accounts published by Dr. L. J. Witts on the indications and dosage of iron, it is surprising to find how little care is often taken in deciding whether a case is one which will benefit with iron or with liver, proprietary preparations combining the two together being very popular. The dosage of iron is generally quite insufficient, complicated organic preparations are too often ordered instead of the simple inorganic preparations, which are also the most effective, and iron injections have not yet passed into the oblivion they deserve.

Anæmia as a cause of symptoms is far more common than is generally recognized, and many middle-aged women with chronic ill-health, which is often ascribed to the menopause, are really suffering from

an easily curable anæmia. The vast majority of cases, including those which follow hæmorrhage, respond with great rapidity to efficient treatment with iron. When I first came to Guy's in 1901 the popular mist. ferri arsenicalis contained five grains of iron and ammonium citrate with five minims of liquor arsenicalis. When I was Dr. Beddard's clerk in the out-patient department he told me to double the dose of iron and halve that of arsenic. Later I increased the iron to fifteen grains and then to twenty grains, and Dr. Witts has shown us that we should increase it still further to thirty grains. It is unsafe to give much larger doses, as one patient of mine almost died from acute iron encephalopathy following the administration of forty grains four times a day for three weeks. We now know that arsenic is useless, and that iron given by injection is quite inert; the popular and expensive Fraise's ferruginous serum may have some effect on the mind, but it has none on the blood. When thirty grains of iron and ammonium citrate are given three times a day, the hæmoglobin generally increases by about one per cent a day, and still more rapidly if the anæmia is severe; for example, a youth of twenty with splenic anæmia who came in with 14 per cent hæmoglobin was prepared for operation by giving him this dose of iron; his hæmoglobin percentage rose to 76 in 45 days.

Though there is a popular notion that iron causes indigestion and leads to constipation there are very few people who cannot take thirty grains of iron and ammonium citrate in half an ounce of water three times a day after meals as long as is necessary without unpleasant results. The anæmia, which is always present after hæmorrhage from an ulcer and which delays healing if left untreated, rapidly responds to this treatment, and so far from irritating the gastric mucous membrane the iron appears to have a directly favourable action on the ulcer and the associated gastritis. In a recent case the hæmoglobin percentage, which, two months after a hæmorrhage, was only 48 rose to 87 in 25 days.

The anæmia in carcinoma of the stomach and colon often improves very quickly, and no case should undergo operation with less than 80 per cent hæmoglobin. Only if the hæmoglobin is very low is it necessary to hasten matters by one or more preliminary transfusions.

Liver and stomach are quite useless in all anæmias except Addison's (pernicious) anæmia and some closely allied megalocytic anæmias, such as that of sprue, and it should be reserved for such cases.

HYDROGEN PEROXIDE AND HYDROCHLORIC ACID IN ACHLORHYDRIA

Achlorhydria is a common sequel of chronic gastritis and is present in about 15 per cent of all patients suffering from abdominal symptoms as well as in about 4 per cent of perfectly healthy young adults. In about 75 per cent of cases the power of secreting acid can be restored by dieting, removal of septic foci from the mouth and throat, and lavage of the stomach when fasting in the morning with dilute hydrogen peroxide (half an ounce to the pint). The hydrogen peroxide acts as a mild antiseptic and dislodges the mucus adhering to the mucous membrane. The treatment is repeated daily until the washings are clear. In many cases a fortnight is enough to restore the secretory activity of the stomach, but in some cases the patient has to continue with the treatment himself for several weeks.

Since I began using hydrogen peroxide lavage for gastritis eight years ago only about a quarter of the patients to whom I should formerly have given hydrochloric acid now require this drug. It should never be used except as a temporary measure until a second test-meal after a course of lavage has shown that achlorhydria is still present, as it is infinitely more satisfactory for a patient to provide his own acid than to have to take it from a bottle. When

the gastritis is so severe that all the acid-secreting cells are destroyed, and when the achlorhydria is due to an inborn error of secretion, as it may be in the rare cases of constitutional and familial achylia gastrica, hydrochloric acid should be given.

When one drachm of dilute hydrochloric acid is mixed with five ounces of water it is only slightly weaker than natural gastric juice. Thus diluted, with the addition of the juice and pulp of an orange and sugar, it makes quite a pleasant beverage, which should be taken before breakfast and with lunch and dinner for the rest of the patient's life. The usual dose of dilute hydrochloric acid is quite inadequate. This was first clearly shown by some experiments made in cases of Addison's anaemia, a condition which is almost invariably associated with incurable achlorhydria, by Dr. Maurice Shaw when my house physician in 1922. He found that one drachm of dilute hydrochloric acid sipped during the hour following a test-meal was rarely sufficient to neutralize the alkaline contents of the stomach, so that no free acid appeared. Occasionally one and a half drachms produced a normal curve and two drachms a hyperchlorhydric curve, but more frequently two drachms were required to produce a normal curve of acidity. In rare instances even two drachms did not lead to the appearance of free acid.

HEXAMINE AS A BILIARY ANTISEPTIC

It has been known for many years that hexamine is excreted by the bile, but Dr. F. A. Knott was the first to prove definitely that it acts as a biliary antiseptic in spite of the bile being alkaline, although in the urinary tract it is inactive unless formalin is set free by the acid urine. Pure bile obtained through a duodenal tube has no antiseptic action, but if large doses of hexamine are given, the bile, which can be shown to contain unaltered hexamine, is strongly antiseptic, and any bacteria which are present in it before the treatment begin to disappear. Formerly the maximum dose of hexamine which could be given with safety was limited by the supposed necessity of keeping the urine acid. But hexamine is just as efficient a biliary antiseptic when sufficient alkali is given to make the urine permanently alkaline; under such conditions no formalin is set free, and enormous doses can be administered without causing any bladder irritation. A mixture containing sixty grains each of sodium bicarbonate and sodium citrate in two ounces of water is given after breakfast, after tea, and last thing at night after drinking a glass of milk or water. The reaction of the urine is tested every time it is passed; as soon as it is found that the urine is constantly alkaline, if necessary after the dose of the alkalis has been increased, a hundred grains of hexamine is added to the mixture, so that three hundred grains are taken a day. The treatment can be continued for periods of six weeks. The hexamine sterilizes the bile-ducts and gall-bladder, and, when combined with non-surgical biliary drainage by means of Epsom salts, it results in the cure of most cases of cholecystitis. This treatment should be given for a week or two before and after operations on the gall-bladder and bile-ducts in order to guard against septic complications. In cases of severe infective cholangitis with jaundice, high temperature and rigors, it has sometimes appeared to save the life of the patient.

Hexamine is excreted into the cerebrospinal fluid and has been found by experiment to prevent the development of poliomyelitis in monkeys inoculated with emulsion of the spinal cord from fatal cases. I think, therefore, that large doses are worth giving in the manner I have just described to contacts in poliomyelitis epidemics, and possibly also during the acute stages of encephalitis and for the cerebral complications of ear and sinus disease.

I should like to suggest that in the next edition of the B. P. explanatory notes should occasionally be

given under the head of dosage. Thus in the 1932 edition the dose of hexamine is given as ten to thirty grains. But five to fifteen grains is the correct dose when it is used as a urinary antiseptic, and fifty to a hundred grains as a biliary antiseptic. For the former acid sodium phosphate or similar drug must be given to keep the urine acid, and for the latter alkalis must be given to keep it alkaline. The higher pharmacopoeial doses—fifteen to thirty grains—are too small for biliary antiseptics and too large for urinary antiseptics, as if given alone and especially if given with acid sodium phosphate they would be very liable to cause severe hæmorrhagic cystitis.

ATROPINE IN THE TREATMENT OF ULCER

There is no doubt that the presence of free acid in the stomach is an essential factor in the development of gastric, duodenal, and anastomotic ulcers, and that such ulcers tend especially to develop in individuals with the hypersthenic gastric constitution in which more than the average quantity of acid is secreted. Successful treatment largely depends upon choosing a diet which calls forth as little secretion as possible and has a high neutralizing power. Alkalis are given to neutralize still more of the free acid, and olive oil and atropine to inhibit its secretion. It is a familiar fact that some people are much more susceptible to the action of atropine than others. Its influence on salivary secretion is approximately parallel to its influence on gastric secretion. In order, therefore, to obtain a maximal effect on the stomach the dose should be increased until the largest quantity is given which does not make the mouth unpleasantly dry. I give 1/200th grain of atropine sulphate dissolved in a drachm of water before three of the feeds and a double dose last thing before going to sleep, as it is particularly important to inhibit the continuous secretion of acid during the night, when there is no food in the stomach which can partially neutralize it. Both doses are then increased by ten minims of the mixture—i.e., 1/1200th grain—every day until the patient complains of unpleasant dryness of the mouth or paralysis of accommodation. After reducing the doses by ten minims they are continued throughout the period of treatment. As the atropine dries the mouth it may be assumed to dry the stomach, and actual tests have shown how effective it is in reducing the quantity of free acid present. It is impossible to guess beforehand what will be the adequate dose in any given individual. Occasionally a patient cannot take more than the initial 1/200th grain three times a day and 1/100th grain at night; the majority can take about 1/100th grain, whilst occasionally as much as 1/40th grain is found to be the correct dose for the day and 1/40th plus 1/200th for the night. It is important to increase the dose in this way, as I believe that 1/200th grain would be without any effect on the last patient though sufficient for the first; in other words, 1/200th grain in one individual is equivalent to 1/40th grain in another.

MORPHIA FOR INCURABLE PAIN

In spite of all the modern advances in therapeutics we must still often rely upon morphia for the alleviation of pain. Inoperable cancer is not necessarily very painful, but when it involves the spine and in many cases of carcinoma of the liver and of the pelvic organs the pain is excessively severe. By the fearless use of morphia it is always possible to keep a patient with this terrible disease comparatively happy and completely free from pain. There is obviously no need to fear the development of a drug habit in a dying patient, but most doctors are curiously averse to giving the huge doses which may be required in such cases. I do not think that the various substitutes for morphia have any special advantage. The dose should be found by experiment which, when given at sufficiently frequent intervals, keeps the patient completely free from pain. As the tissues quickly develop

the power of destroying increasing quantities of morphia so that only a small proportion is left to exert its analgesic effect, the dose has to be steadily increased in order to remain adequate. The dose required during the last week of life in a patient who survives for an unusually long period may be huge—as much as fifty grains a day, but it should be remembered that this is really equivalent to about one grain a day at the onset of treatment, most of the morphia being destroyed in the liver and other organs. Many patients with secondary cancer of the liver and spine live for many weeks, and even many months, and I am inclined to think that the morphia often delays death—its one disadvantage, though this is more a disadvantage to the unhappy relatives than to the sleeping patient. For a proper dose is one which keeps the patient in a continuous state of twilight sleep; the sleep is often dreamless, but when dreams occur they are generally happy ones. The patient is easily roused three or four times a day to take a little nourishment, but he only wakes sufficiently to smile and murmur a few words.

ADRENALINE IN ASTHMA

The pharmacopœial dose of adrenaline is both too large and too small. It is too large for habitual use in ordinary cases of asthma and too small for use in the exceptional cases of status asthmaticus. In spite of recent advances in our knowledge of asthma it is comparatively rare that a patient is given such complete relief that he never has another attack. It is therefore necessary in almost every case to devise some treatment for the asthmatic paroxysm itself.

In the treatment of the asthmatic paroxysm the preponderating activity of the vagal over the sympathetic nerve-supply to the bronchi can be overcome by means of drugs, such as atropine, which paralyse the vagus, or by adrenaline, which stimulates the bronchodilator fibres of the sympathetic. The inhalation of fumes from powders containing stramonium or belladonna, which was formerly the universal method of treatment, had the grave disadvantage of causing chronic bronchitis by irritating the bronchial mucous membrane. This treatment should never be used, as the opposite method of restoring the balance by means of adrenaline has no such disadvantage and is also more promptly and more constantly effective. The patient should be taught to inject the adrenaline himself, as if he does this at the first sign that an attack is developing it will be aborted, and one or two minims will often be sufficient, though five or more would have been required had he had to wait for a doctor or nurse to give the injection at the height of the attack. This small dose gives rise to none of the unpleasant symptoms often caused by larger doses, which sometimes make a patient prefer the asthma to the adrenaline, and as it does not even raise the blood pressure there is no danger of damaging the arteries. Its use has in many cases the further justification of making good a deficiency in the secretion of adrenaline, just as thyroid preparations do in myxœdema. The treatment also reproduces the way in which relief may on rare occasions occur under natural conditions. If an individual during a severe attack of asthma comes under the influence of sudden fear or anger, the two emotions which W. B. Cannon showed stimulate the secretion of adrenaline, the attack immediately ceases, the patient having had an 'autogenous dose' of adrenaline. We may hope that the time will come when asthma will be curable, but until that consummation has been attained, the proper use of adrenaline deprives asthma of most of its terrors, and makes it possible for every asthmatic to live a life of moderate activity. The patient should be provided with a pocket case containing a small bottle of adrenaline, a special small all-glass hypodermic syringe with very fine bore so that minims and half minims can be accurately measured up to a maximum of seven minims, an 'iodine pencil' and a spare needle.

The rare condition of status asthmaticus, in which severe asthma continues uninterruptedly for days or weeks and may end in fatal exhaustion, can always be arrested by the method of continuous adrenaline injection which I first used about ten years ago. The needle is kept in position with a full syringe, and after an initial injection of a dose which is known to cause no unpleasant symptoms, one or more minims are injected every 15, 30, or 60 seconds, according to the patient's reaction, the rate being varied until it is found how frequently the injection can be made without tachycardia or other symptom arising. The injections are continued, if necessary, for even half an hour or more; relief always follows and generally manifests itself by the patient falling into a deep sleep, which may be the first he has had for several days.

Anaphylaxis can also be most efficiently treated by this method of injecting adrenaline, which is far more effective than occasional injections of larger doses. If adrenaline is always at hand when a patient is given serum or other treatment which may cause anaphylactic reaction, the latter should never prove fatal.

The Basal Metabolism of European Women in South India and the Effect of Change of Climate on European and South Indian Women

By ELEANOR D. MASON

(Abstracted from the *Journal of Nutrition*, Vol. VIII, No. 6, 10th December, 1934, p. 695)

MEASUREMENTS on thirty-four European women resident in the city of Madras, which has a mean annual temperature of 82.8°F. and a relative humidity of 72 per cent, showed an average metabolism 7.9, 6.3, and 12.5 per cent below the Harris-Benedict, Dreyer and Aub-DuBois standards, respectively. By the same standards this was 9.0, 9.9 and 4.7 per cent above the average metabolism of Indian women in Madras. The mouth temperature was slightly higher than reported in Western countries and the pulse and blood pressure as low or slightly lower. These three measurements do not differ significantly from those of Indians. The European vital capacity was normal and very much higher than that of Indian women.

Nine European women studied in both temperate and tropical climates showed two types of response to the tropics. One group showed a marked decrease in metabolism, a fairly marked fall in pulse rate and no rise in mouth temperature. The other group showed no change in metabolism, a slight fall in pulse rate and a rise in temperature of from 0.2°F. to 0.7°F. The high correlation found in this small group of subjects between change in metabolism and change in temperature is supported by a high correlation between temperature and metabolism in the series of thirty-four women measured in Madras. The average decrease in metabolism of the group of nine moving to the tropics was 5.1 per cent. Three Indian women measured in two climates showed an increase in metabolism of 4.8 per cent in cold climates. These data suggest that approximately 5 per cent of the low metabolism previously reported for Indian women may be attributed to the effect of tropical climate.

Treatment of Undulant Fever

By J. E. DEBONO, M.D.

(Abstracted from the *Lancet*, 16th February, 1935, p. 374)

THE treatment of undulant fever has always been baffling and disappointing. Although the mortality is relatively low, the protracted course of the infection, together with the monotonous succession of relapses and our therapeutic helplessness, make this disease one of the most trying to the patient and to

his medical attendant. Very many remedies have been suggested ; sera, vaccines, protein shock, chemotherapy, and other less orthodox methods have been experimented with. From time to time enthusiastic reports are published, but despite occasional successes the general impression is that the disease tends to run its course in spite of treatment.

In 1929, while working with Prof. Zammit on the immunization of goats, it occurred to me that the filtrate which was being used as a prophylactic might also have a therapeutic effect. Subsequently it was discovered that melitine had already been suggested and used as a therapeutic agent. No claim to originality is therefore made.

The first results, although definitely encouraging, were somewhat inconstant. This was probably due to the low potency of the original filtrate and to excessive caution in the dosage. In 1931 and 1932 a supply of brucellin was obtained through the kindness of Dr. I. F. Huddleson, and in 1933 a small quantity of the specific nucleoprotein. The results obtained with these and with an eight-week filtrate of *Brucella melitensis* have exceeded all expectations and have encouraged me to the publication of this preliminary note.

In all 105 cases have been treated up to date. Of these 68 were seen during the first pyrexial wave, usually within three or four weeks of the onset. In another 30 the infection had been present for more than two but less than six months, while in the remainder it had assumed a chronic form. The majority were of the moderately severe type common in Malta. There were no malignant cases.

The technique adopted after many experiments was as follows :

An intradermal injection of 0.2 c.cm. was first given, in order to confirm the diagnosis and to gauge the patient's reactivity. The subsequent dosage depended on the local and general reaction to this injection, the stronger the reaction, the weaker the initial dose. As a rule this varied between $\frac{1}{2}$ and $\frac{3}{4}$ c.cm., and was given intramuscularly.

With a sufficient dose the thermal reaction is sharp and immediate. The temperature begins to rise in 6 to 12 hours, reaches a maximum in 12 to 18 hours and is usually down by the next day. In the most favourable cases it drops to considerably below normal. Headache, shivering, and general malaise are frequently observed, but although the temperature may rise above 105°F., it does not persist at this level for more than a few hours and no untoward symptoms have been observed. A second injection of $\frac{1}{2}$ to 1 c.cm. is given in 3 to 4 days according to the severity of the reaction.

In the majority of cases two to three injections are sufficient, a fourth being given to make doubly sure.

At first the injections were only given during the decline of the pyrexial wave, or when the temperature was relatively low. As time went on it was realized that in the acute cases the reaction was relatively mild and did not upset the patient to any extent. The filtrate was therefore used more extensively and without waiting for the temperature to come down.

The results varied with the period of the disease and with the preparation used. During the first pyrexial wave it was possible to obtain a definite abortion of the infection in 58 out of 68 cases. In the majority of these the temperature came down permanently after the third or fourth injection. In 8 five doses were required. In the light of more extended experience it seems probable that the failures were due to insufficient dosage and lack of perseverance.

In chronic cases the effect is not so striking. The reactions tend to be more severe and smaller doses have to be used. This susceptibility is particularly marked in patients who have been treated by ordinary vaccines. It was relatively easy to cut short a pyrexial wave but the fever tended to reappear after a longer or shorter interval. Lately it was found possible to prevent further rises by continuing the injections during the apyrexial period. Of the 37 patients in this group 20 reacted satisfactorily, the fever subsiding in less than a fortnight. In 6 cases the treatment had to be abandoned on account of the severity of the reactions, while in the other 11 the filtrate did not seem to be making any permanent impression on the temperature chart.

In a disease like undulant fever, where the course is so erratic and the duration so indefinite, it is difficult to assess the value of any particular line of treatment. In the present series, however, the results have been so immediate, so true to type, and so relatively constant, that it would be pedantic to attribute them to coincidence in every case.

Similar results have been obtained in America by Huddleson and Howard, who have published a series of 80 cases treated successfully with brucellin. In France melitine and the specific endoprotein have been used extensively, and very good results have been reported by Montel, Melnotte and Masson, Cambessèdes and de Nattan-Larrier, and by Cambessèdes.

It is, of course, too early to claim melitine or brucellin as an infallible specific, and there is still considerable discussion as to its mode of action; but there is enough *prima facie* evidence to justify further investigation and a more extensive trial.

Reviews

THE COMPLETE PEDIATRICIAN. Practical, Diagnostic, Therapeutic, and Preventive Pediatrics, for the use of Medical Students, Internes, General Practitioners, and Pediatricians. By Wilburt C. Davison, M.A., D.Sc., M.D. 1934. Duke University Press, Durham, N.C.

The title page of this remarkable compilation is an adaptation of the title page of the *Compleat Angler* by Izaak Walton, 1653, and the resemblance between the two books does not stop there. It is easy to picture the author as a disciple of the gentle art and he must have had his tongue in his cheek when he chose such an appropriate title. The contents of the book require as much playing and patience as the wildest salmon, but perseverance will always land a good catch.

The book contains a vast collection of facts and data relating to the science of the pediatrician and represents an enormous amount of painstaking and

detailed work. Naturally it emanates from America which country has been the author and finisher of all potted goods. But there are many good canned products and the *Compleat Pediatrician* is a sample of the good class.

The book has been arranged in the same sequence as the physician uses in examining and treating a patient. Chapter I is devoted to signs and symptoms, and the numbers given after each heading refer to chapter II, which is headed diseases, differential diagnosis, and treatment. Here each disease is catalogued from abscess to yellow fever. Chapter III discusses preventive measures and child care, and chapter IV, the administration of fluids and blood to infants. Chapter V is probably the best part of the book and here the author breaks into ordinary prose and the book takes on an almost human touch. The reading matter in this chapter is excellently displayed, clear, full and precise. The directions for the feeding

of normal infants and older children will be of considerable value to the harassed practitioner who can rarely find such a wealth of definite and direct information in any one single book on the subject of diabetes.

Chapter VI is devoted to drugs and prescriptions used in pediatrics and the last chapter, to laboratory methods.

The format of this book is good, the printing clear, and errors of any kind are rare.

The book will be of value to both students and practitioners, especially the latter, but cannot be recommended as a useful book for candidates preparing for examinations. Its place is on the desk as a reference book, which can be relied on as accurate, concise and thoroughly up to date. It does not provide the peaceful atmosphere of the usual textbook and leaves the reader to gasp with astonishment at the industry and perseverance of the author. It fulfils a definite need and many will find its compressed pages a real treasure, albeit a treasure that needs hunting for.

D. M.

RECENT ADVANCES IN NEUROLOGY.—By W. Russell Brain, D.M., F.R.C.P., and E. B. Strauss, D.M., M.R.C.P. Third Edition. 1934. J. and A. Churchill, Limited, London. Pp. xiv plus 442, with 40 illustrations. Price, 15s.

The present edition is a distinct advance on its predecessors. A considerable amount of new matter has been added and in this connection special mention may be made of cerebral angiography, new conceptions of neurotropic viruses—poliomyelitis and acute encephalomyelitis—and nerve complications in infectious diseases. The physiological and clinical interpretations of the symptoms produced by different pathological changes in the brain and nervous system will be of great value to students and medical practitioners. The book consists of 23 chapters, the first 20 chapters deal with the pharmacological and pathological study of cerebrospinal fluid, intracranial circulation and intracranial tumours, various changes produced in the tendon reflexes, vision and pupils, and the postures of the body. The last three chapters deal with the injection treatment of sciatica, ketogenic treatment of epilepsy, and x-ray therapy for intracranial tumours.

The book is very well written and will be greatly appreciated by students of neurology for the up-to-date information regarding the recent advances in this difficult but important subject.

R. N. C.

HIGH BLOOD PRESSURE.—By J. F. Halls Dally, M.A., M.D. (Cantab.), M.R.C.P. (Lond.). Third Edition. 1934. William Heinemann (Medical Books), Limited, London. Pp. xxii plus 281. Illustrated. Price, 15s.

THE reception accorded to this useful handbook on blood pressure has led to the publication of the third edition and the author has thus had the opportunity of bringing the work thoroughly up to date. The present volume has been re-written and a considerable amount of relevant matter and fresh illustrations have been added.

Arterial hypertension, as symptomatic of various underlying causes, is the theme of this book. The causative factors, the clinical manifestations, and the study of control of high arterial pressure have been presented from the view-point of practical medicine. The author has covered the whole ground in a very matter-of-fact, concise, and lucid manner, and, in spite of the vast literature reviewed, there is no overloading. The list of references appended at the end of the book is of great help to those who desire further information.

The book can be confidently recommended as an accurate and practical guide to the senior students, and the general practitioner on this important subject. It makes easy and pleasant reading.

R. N. C.

RESEARCHES ON TROPICAL TYPHUS. A STUDY OF THE BACTERIOLOGY, SEROLOGY AND EPIDEMIOLOGY OF THE DISEASE.—By Ludwik Anigstein, M.D., Ph.D. Studies from the Institute for Medical Research, Federated Malay States, No. 22, Kuala Lumpur. 1933. Pp. 184; illustrated.

A GREAT deal of confusion exists regarding the typhus group of fevers. Besides the classical typhus exanthematicus various typhus-like fevers have been described which differ in their clinical and pathological features in different parts of the world. It is therefore very refreshing to read this present monograph on tropical typhus by Dr. Anigstein from the Institute for Medical Research, Kuala Lumpur. Tropical typhus in the Malay States was first described by Fletcher and Lesslar in 1925; they distinguished two types—the rural and the urban type. During the author's period of investigation there were 237 notified cases, 170 of which were of the rural type and agglutinated XK, while the remaining cases belonged to the urban type and agglutinated X 19. The author was successful in conveying the disease to several arthropods, guinea-pigs, rats and rabbits, and found Rickettsia-like organisms in the congested tunica vaginalis of these animals. From the various strains of organism isolated from human and animal cases Rickettsia-like bodies, spindle-shaped organisms, coccobacilli and proteus forms were obtained. Dr. Anigstein is of opinion that the virus of typhus represents the parasitic stage of proteus X.

The question of the probable vector of the disease is still undetermined. *Trombicula deliensis* is suspected, but the author failed to infect a volunteer with emulsion of crushed mites. Body lice are not the usual vectors though they could be infected by allowing them to feed on patients or by rectal inoculation. A mixed prophylactic vaccine was used with promising results as a prophylactic measure in an endemic palm-oil estate. The book will be read with interest by all those who are interested in the subject.

R. N. C.

WHAT OF THE CHILD?—By Dr. Andrew Kefalas, M.A., M.B., Ch.B. 1934. William Heinemann (Medical Books), Limited, London. Pp. xvi plus 187. Price, 5s.

MANY are the errors into which parents may fall in the upbringing of their children. Dr. Kefalas as a medical psychologist has frequently met with and overcome the results of these errors in management, and the outcome of his practical experience is this small and simple book.

It deals mainly with psychological problems in the upbringing of the pre-school and school child, and of the boy or girl during puberty and adolescence; it is thus wider in scope than most books of similar type. Advice is given on the choice of books and of a school, on the nature of the religious and sex instruction which should be given at different ages, and on the varying relationships between parents and children as the latter become more and more individual and independent. The advice is definitely personal in outlook and expression, but it is never extremist. The author is 'fairly temperate, and reasonable', and the book should prove helpful to many parents and teachers who wish to guide their children to a sane and happy adjustment to life under our present-day civilization.

J. M. O.

A HANDBOOK OF OPHTHALMOLOGY.—By H. Neame, F.R.C.S., and F. A. Williamson-Noble, F.R.C.S. Second Edition. 1935. J. and A. Churchill, Limited, London. Pp. xiv plus 339, with 12 plates, containing 46 coloured illustrations and 147 text-figures. Price, 12s. 6d.

THERE are so many excellent books on ophthalmology written in the English language that one is

surprised at the appearance of yet another, but as this is the second edition of the handbook this alone is proof of its popularity and usefulness.

The book has been brought up to date by the addition of modern methods in the treatment of retinal detachment by electro-coagulation, recent work in the aetiology of glaucoma, the treatment of ptosis by Greeve's operation, the increased uses of tuberculin, the use of T.A.B. vaccine in protein shock therapy and treatment by ultra-violet radiation. There is also a chapter devoted to tropical ophthalmology which is unfortunately disappointing, and will be of little practical use to the medical man working in India.

More space should have been devoted to and emphasis made on diseases which are very prevalent in India. For example superficial punctate keratitis, glaucoma and the various complications of syphilis. These are so often not diagnosed in the early stages. On the other hand descriptions have been given of diseases which are rarely seen.

Beri-beri is a disease which is practically unknown in India but is often confused with epidemic dropsy which is common in Bengal and one of the great causes of primary glaucoma. Likewise pellagra is rarely seen. The commonest ocular complications of malaria are retinal hæmorrhages of all kinds and produced in the great majority of cases by the accompanying anaemia. 'Malarial amblyopia' and to a lesser extent quinine amblyopia are very uncommon occurrences in spite of the large amount of malaria that occurs in India.

The ocular complications of dysentery are also rare.

The only eye operations mentioned in the chapter on tropical ophthalmology are the treatment of cataract by Smith's operation of intra-capsular extraction and the 'three needles operation' for the treatment of anterior staphylomata. Undoubtedly the best treatment for the removal of cataract in the large proportion of cases is by the intra-capsular method and it is not more difficult or dangerous in experienced hands, but the so-called Smith operation should only be attempted in the case of senile cataracts which are hypermature and which are not possible to remove by the forceps or Barraquer methods. In the large teaching centres in India the Smith operation is not popular as it is considered unsafe and dangerous and with present up-to-date methods vitreous loss should be almost entirely eliminated. The author does not point out the importance of facial akinesia as a routine in all cases, as it eliminates all squeezing and to a great extent the importance of the assistant. The method is simple and can be learned very quickly even by the inexperienced operator. It is truly one of the greatest advances in modern operative ophthalmology. It should not be necessary to give general anaesthesia in the operation for the removal of cataract, and no case should ever have both cataracts removed at the same time.

The book is well supplied with black and white and coloured illustrations and with the exception of the chapter on tropical ophthalmology is excellent and we recommend it for students who wish to study ophthalmology.

E. O'G. K.

AIDS TO SURGERY.—By Cecil A. Joll, M.S. (Lond.), M.D., F.R.C.S. (Eng.), and R. C. B. Ledlie, M.B., B.S. (Lond.), F.R.C.S. (Eng.). Sixth Edition. 1935. Baillière, Tindall and Cox, London. Pp. x plus 612, with 44 figures. Price, 7s. 6d.

THE 'Students' Aids Series' is sufficiently well known to need an introduction. The present (sixth) edition is a decided improvement on its predecessors. The chief danger of a synopsis of this type is that it is apt to encourage the pernicious habit of cramming. The surgical dresser, who has done his clinical work well, will find, in this book, a satisfactory outline of the subject.

Hilton's method of opening a deep abscess has not been quite accurately described. He advised the use of a grooved probe or director and a blunt instrument like a pair of dressing forceps. In the treatment of tetanus, avertin possesses many advantages over inhalation anaesthesia and magnesium sulphate. Foundin has practically supplanted antimony tartrate in the treatment of bilharziasis. In case of the tropical or solitary abscess of the liver, repeated aspirations combined with emetine injections are usually successful. The paragraph on elephantiasis is inadequate. Elephantiasis nostra or non-filarial elephantiasis has been practically ignored. We should have much preferred to see melanoma, included under carcinoma.

Owing to rapid advances in our knowledge, surgery has assumed a bulk which it is difficult to assimilate. It is therefore desirable that textbooks of surgery should deal mainly with fundamental facts and practical points, discarding alternative archaic methods of diagnosis and treatment. Sayer's method of treatment of a fractured clavicle is a case in point: it hardly deserves a paragraph to itself. Greater space might have been usefully devoted to important subjects like Böhler's method of non-padded plaster casts and Kirschner's wire traction. A noteworthy feature of the present edition consists of its excellent illustrations, for which great credit is due to the editors. The index appears to be adequate and the volume is of a suitably small size.

P. N. R.

SIMPLE INSTRUCTIONS FOR DIABETIC PATIENTS.

—By Dorothy C. Hare, M.D., M.R.C.P. Second Edition. 1935. Published by H. K. Lewis and Company, Limited, London. Pp. 22. Price, 1s.

A REVIEW of the first edition of this little book appeared in this *Journal* about two years ago. The present edition contains, like its predecessor, much useful information of a somewhat broad and general nature and as such may prove to be of value to diabetic patients undergoing treatment, as well as to nurses having to deal with such cases.

J. P. B.

DIABETES MELLITUS AND OBESITY.—By G. G. Duncan, M.D., C.M. (McG.). 1935. Published by Henry Kimpton, London. Pp. xii plus 215. Illustrated. Price, 12s. 6d.

THIS book has been written from a practical point of view, and in its simple and clear style will make a special appeal to medical students and general practitioners, most of whom have very little time to go in for the theoretical and controversial matters in connection with the disease, but require a good working knowledge of the disease and its various complications.

One useful section of the book deals with obesity, especially in relation to the part it plays in the aetiology of diabetes.

We are of the opinion that both the medical student and the general practitioner will find the book of much help in dealing with cases of diabetes in a practical and methodical way.

J. P. B.

A BRIEF OUTLINE OF THE MODERN TREATMENT OF FRACTURES.—By H. Waldo Spiers, A.B., M.D. 1935. Baillière, Tindall and Cox, London. Pp. ix plus 129, with 109 figures. Price, 8s.

DR. SPIERS states in his preface that he has written this brief outline of the modern treatment of fractures merely to illustrate the fundamentals of bone surgery, because modern textbooks are so filled with illustrations and operative technique that the average student is frequently at a loss to know what it is all about.

He has certainly succeeded in his object and has put before the student, albeit extremely briefly, the fundamentals of bone surgery. He has been careful to

warn the young practitioner not to put his faith too much in metal, but to use other and absorbable material when it is necessary to perform an open reduction and fix the ends of the fragments.

Dr. Spiers recommends that metal plates should only be used when it is impossible to keep the fragments in alignment by any other means. Truly a sound surgical dictum. Many other sound principles are brought to the notice of the reader but on the whole the book is too short and too scanty of detail to stand alone.

However, if the student when preparing for his examinations will read this book in conjunction with his textbook and digest its contents it will have served its purpose and for this it can be recommended.

H. E. M.

THE CHAIN OF LIFE.—By Guyon Richards. 1934. Published by John Balo Sons and Danielsson Limited, London. Pp. xiii plus 215. Price, 6s.

THIS interesting book of 215 pages deserves to be read not only by medical men, be they allopaths or homeopaths, but also by scientists, philosophers, spiritualists and laymen. The matter contained in the book relates to the subject of ætheric waves and their relation to disease. It is well presented and grips the reader in a manner similar to that of Edgar Wallace's stories. It is impossible to summarize the twenty-two chapters of the book or to comment on them individually. For purposes of this review it is enough to state that in the book the view is expressed that the whole universe is pervaded by ætheric waves or 'wireless' waves and every animal, plant, and non-living matter sends out and receives, even though situated at great distances from one another, ætheric waves. These waves operate on them differently according to their nature. So far as man is concerned the waves influence the state of his body and mind. In health man sends out one kind of wave and in disease another kind. By recording the nature of the waves sent out by the body in some suitable receiving set it is possible not only to determine whether a person is healthy or diseased but also to state what the nature of the illness is. All that one has to do is to study the ætheric waves emanating from a sick person by putting him in an electric circuit as for obtaining an electrocardiogram and then after having noted the deflection in a galvanometer to refer to the diagnostic table provided. It is interesting to learn that the reading for cancer is 80,441, for syphilis 88,037, for rheumatism 65,061, for malaria 38,150 and so on. It is not only diseases that can be detected in this way but also certain mental states. The figure for a suspicious person is 12,717, for a despondent person 85,530, for a forgetful person 47,653, for a restless person 77,130 and so on. The researches conducted by the author also indicate that there is only one disease and that differences in manifestations noticed are merely due to differences in the stage of the disease. With regard to treatment, man being body, soul, spirit and ætheric waves, it is important to treat all these factors. Drugs, diet and the knife are not enough to cure the case. The environment, the psyche and the ætheric waves that influence man should also be considered and properly tackled. This can only be done by first determining the ætheric waves of drugs, food-stuffs and endocrines, studying their relation to the diseased state and then giving such of them as would influence the case favourably. In the book a detailed list of the substances to be used is also provided. By way of comment we wish to add that after reading the book one certainly feels that the future of mankind is extremely bright and that the state will not have to worry itself with any public health or medical problems. It will not build hospitals nor train doctors, for treating the sick, it will not employ a huge public health staff for preventing and controlling the spread of infection. All that it will do will be to

instal a large number of electrical apparatus, similar to the one recommended by the author, at different parts of the state so that people may go to them and by putting a penny in the slot, by observing the number that is indicated by the dial, and by pressing the specified button obtain a packet of medicine which will not only cure them of the disease that they suffer from but also establish balance and harmony in the ætheric waves and in the whole universe.

K. V. K.

TUBERCULOSIS IN THE CHILD AND THE ADULT. A Discussion of Pathologic Anatomy, Pathologic Physiology, Immunology, Diagnosis and Treatment.—By F. M. Pottenger, A.M., M.D., LL.D., F.A.C.P. 1934. The C. V. Mosby Company, St. Louis. Pp. 611. Illustrated. Price, \$8.50

THE book aims at a discussion of the pathologic anatomy, pathologic physiology, immunology, diagnosis and treatment of pulmonary tuberculosis. This has been dealt with in 32 chapters with 85 illustrations. A connected bibliography is given at the end of each chapter.

Before describing the childhood and adult types of tuberculosis, the author has rightly put in a discussion on the host's response to re-inoculation of tubercle bacilli. He has succeeded in giving a reasoned explanation of the response in terms of cell sensitiveness, allergy and immunity. Tuberculosis workers are now beginning to appreciate that a proper knowledge of this subject is not only essential whereby to interpret signs and symptoms but also to assess the prognosis of a case of tuberculosis. The author has rightly taken considerable space to explain the nature of tuberculo-allergy and the causation and process of tuberculin reaction, proliferative and exudative changes and the nature of cavities, although his observations have sometimes gone beyond the findings of experimental work (pp. 148 to 151). The subject of childhood infection has rightly received more attention, as the story begins in childhood and the initial and re-infections are of fundamental importance in understanding tuberculous phenomena in the adult.

The phenomena as seen in less tuberculized races, e.g., in America, South Africa and India, do not seem to have attracted the attention of the author, although the question of primary complex in adult life has justly been brought forward. Some of the findings regarding seasonal incidence (p. 141) and incidence among certain classes (p. 144) do not agree with Indian findings. A study of the various factors which bring about tissue reactions under different environmental conditions in various countries might lead us to a revision of some of our ideas on re-infection, exogenous or endogenous.

The much-neglected subject of the visceral neurology of pulmonary tuberculosis, of which the author has made a special study, has been dealt with in a special chapter. The chapter on diagnosis has been very well written. The method of sputum examination by the Dilution-Flotation-Picric acid method, developed by Dr. J. E. Pottenger, has been described as one of the best methods of examination of sputum by concentration. Practitioners would probably like the chapter on x-ray interpretation to be a little more elaborate, as roentgenology gives us information not only on the localization of the disease but also enlightens us about the pathologic nature of the lesion in terms of allergy and cell sensitiveness.

The principles for the choice of a method for the successful treatment of a case have been ably described in chapter XXIV. The various methods of compression therapy have also received attention. Practitioners would probably like some more practical hints on this subject.

The concluding chapter has been devoted to a number of illustrative case records showing different

phases of pathology and problems in diagnosis and treatment.

The subject-matter of the book forms very stimulating reading. All the latest developments on the subject have been correctly presented in an attractive form. The book is likely to be useful to all practitioners and students of medicine. The printing and paper are good and the production reflects credit on the publishers.

A. C. U.

THE CONSTRUCTION OF MODERN HOSPITALS AND THEIR EQUIPMENT: Technical and Practical Manual for Doctors, Architects, Engineers, Technicians, Staff of Administration, Students and Practitioners.—Edited by M. Schaerer, S.A. Berne (Switzerland). 1935. Published by M. Schaerer S.A. Berne, Switzerland. Pp. 676. Illustrated. Price, 40/- (Swiss francs).

It is very difficult to condense in a few lines a review of this book of over 600 pages and 900 illustrations

covering very thoroughly and with meticulous care a wide field in the construction and equipment of modern hospitals with their adjuncts such as laboratories, dispensaries, kitchens, laundries, outpatient departments, etc. The key-notes seem to be space, ventilation, lighting, cleanliness and architectural design and its perusal impresses one with the fact that among those contemplating the building of medical institutions and accommodation for their supplementary services, there should be the closest co-operation between medical authorities, architects, sanitary and electrical engineers, and a book of this kind giving a wealth of information would be very valuable to them. The instruments and equipment illustrated, most of which are designed and made by the publishers M. Schaerer S.A. Berne (Switzerland), appear to be the last word in modern design and ingenuity. Many novel features have been introduced in their construction for the comfort of the patients and the convenience of the staff.

R. T. M. H.

Abstracts from Reports

REPORT OF THE GOVERNMENT CINCHONA PLANTATIONS AND FACTORY IN BENGAL FOR THE YEAR 1933-34

THE early uncertainty as to what might happen to the guilder when major currencies went off gold was held responsible last year for the large drop in the price of quinine from Rs. 26 to Rs. 19-8 per pound and was the main consideration of the year. The principal features this year, on the other hand, are a re-establishment of the confidence formerly felt in the quinine market and the maintenance of steady prices. The market price of quinine has risen some two rupees from its lowest level and stands at present at Rs. 21-12 per pound. Although there is in this commodity as marked over-production as in many others, steps are now being taken to limit output by restricting bark harvests, and the industry may be said to be in the process of adjusting itself gradually to present-day demands. A period which may run into years must, however, elapse before any degree of equilibrium can result, and only the firm hand of the monopoly stands at present as a steadying influence in the world's quinine markets. The efforts of the Kina Bureau to maintain stability are aided, it would appear, by the commonsense attitude of the Dutch planters who in adopting a policy of voluntary restriction have taken the only course other industries have found possible to the steadying of markets under present conditions of curtailed international trade. The price of the drug remains stable at a remunerative rate, and in spite of the recent advent on the market of competitive synthetic products such as plasmoquine and atebirin the belief is held that only a revolutionary discovery of some cheap and effective and at the same time easily administered product of the laboratory can disturb the pre-eminent position that quinine maintains as the world's specific for malaria. This, in any case, is the view taken by traders in the industry, and it is to be presumed that they keep themselves acquainted with developments in synthetic chemistry and can best estimate the probability of manufacturing a suitable substitute for quinine. So far there is no sign of this for, while recent additions to the list of drugs used in combating malaria may prove valuable aids in the hands of the practitioner and are to be welcomed as such, they cannot be viewed as other than expensive alternatives useful in certain cases only, but lacking the advantages quinine enjoys by its price and by the ease of its administration. Apart from its well established utility quinine holds its own as the only

drug that the layman himself can administer with safety. It is unpalatable but it is safe, and in view of the widespread nature of the disease and the poverty in general of the malarial population no drug that requires a doctor to administer it is ever likely to take the place quinine holds in alleviating suffering among the masses. This opinion is not confined to those engaged in quinine manufacture. It is a view current with the medical profession itself, the profession in India no less than elsewhere, for it found repeated expression during the discussion on supplies held at a recent conference of medical research workers in Calcutta. Although there can be no certainty in such matters, it may be taken as most probable that quinine will continue to be the main weapon against malaria. Policies for production and for a wider distribution of the drug will, therefore, continue to occupy the public mind. They are doing so now in an increasing degree. The year under review itself has witnessed the inauguration of a scheme for a wider distribution in certain selected districts in Bengal, and the Government of the Punjab have initiated a measure of mass distribution that may well prove to be the precursor of similar schemes throughout India. Attempts are at last being made to put quinine on sale at a cheap price in the smallest *hats* and bazaars, wherever indeed tobacco is on sale, and while it is too early to speak of success for the scheme it can scarcely fail to bring some measure of relief to the poorer class of sufferer. It was for this class the Cinchona Department was developed. Its products were intended for the ryot and it can feel renewed enthusiasm at the prospect of its work beginning to reap in a new manner the benefit originally intended.

The work of the department during the year under review has not been confined to the lines previously followed. The section of this report which deals with the factory will show what new directions have been taken and what duties have had to be assumed by the staff, but, generally, it may be said here that the variety of product has been extended, while good progress has been made in the routine production of a product that should be in demand in all the markets of the world where quality is of first importance. If the demand for quinine in India alone be considered there might be some difficulty in justifying great refinement in a drug that is so universally needed. It may be argued that a product less refined and at a cheaper price would better serve national ends,

especially if the refinement, as in this case, adds little or nothing to medicinal value. But with immense supplies to dispose of the department must follow a policy that will help to allow of surplus stocks being reduced, and nothing short of purification to a standard that the world's markets will accept can allow our quinine to compete with better known brands. That the Bengal department has reached the stage of influencing markets and prices may be inferred from the fact that the Kina Bureau itself is interested in the question of the use to which our stocks are to be put. Negotiations with this body have been progressing on the subject.

The factory has continued to work at high pressure with all its resources in plant and machinery forced into full play. Even larger harvests than last year's had to be dealt with in spite of which the usual efficiency of extraction has been maintained. Throughout the monsoon part of the plant had to be operated overtime at nights in order to cope with an exceptional demand for quinine tablets arising out of a severe epidemic in several districts, as also the decision to make larger stocks available at the post offices. The skilled operators and all hands concerned worked ungrudgingly and with commendable zeal during this strenuous period.

Considering the large increase in bark the production has not increased much relative to some of the post-war years, but it must be remembered that in those days half of the raw material came from the very rich Java supplies belonging to the Government of India which are not available now. But the Java bark is expensive and offers only a small margin on manufacture whereas the locally grown bark is comparatively cheap without being really poor in quality and is, therefore, financially more productive.

In recent years all the quinine has been extracted in the crude or semi-purified form and stocked as such. But during the current financial year provincial stocks of purified quinine completely gave out and enough had to be made to meet current demands. Of the total of 45,728 pounds of quinine from the Bengal barks 24,764 pounds were taken to the finished stage, the balance being left in the crude. A further 2,143 pounds of the purified product were obtained from provincial crude stocks in the course of large scale experiments on crystallization. The demand for quinine tablets was, as mentioned before, unusually heavy this year and 26,628 pounds of sulphate powder were compressed and the bulk of the product packed in the form of treatments. As to other quinine salts, 832 pounds of sulphate were converted into hydrochloride or bi-hydrochloride and 66 pounds into tartrate. Of the last item the greater part went to the Public Health Department in the form of 2-grain tablets, presumably for administration to children.

Of the cinchona febrifuge 5,434 pounds were made into tablets, the balance of the year's manufacture having been sold as powder. As in previous years, the demand exceeded the supply and was met in part by 5,054 pounds from India stocks. This reserve is, however, getting low and will no longer be available for the Bengal area of distribution. It is seldom realized that not only is the yearly supply of cinchona febrifuge limited by the quantity of the bark that can be worked in the factory, but that for every pound of this product obtained about two pounds of quinine sulphate also comes from the bark. It is fair, therefore, that cinchona febrifuge should be rationed and the amount allowed to a purchaser made proportionate to the quinine taken for it is only on this basis that the present low price of cinchona febrifuge can be maintained.

laboratory has been busy with the usual routine as well as those undertaken for the plantations for the valuation as well as cultural control. Of certain cinchona febrifuge samples was for the malaria survey of India. The

present methods of analysis for this substance are very unsatisfactory, different quinologists obtaining different results with the same sample. The matter is of some importance owing to its bearing on the totaquina question, but much as the technical staff would like to study the problem their present heavy and multifarious responsibilities including those related to audit and accounts do not leave any time for purely scientific research.

FOURTEENTH ANNUAL REPORT OF THE CALCUTTA DENTAL COLLEGE AND HOSPITAL, 1935

THE outstanding event of the year, as far as dental education in Bengal is concerned, has been the appointment by the Government of Bengal of a Dental Education and Registration Enquiry Committee, in November 1934. The committee has been asked to go into the question of dental education and registration in this province. We can justly congratulate ourselves on this development as for the past thirteen years we have been trying to organize and impart dental education in this province. We understand the committee has sent up an unanimous report to the Government of Bengal recommending the establishment of a State Dental Board and for the affiliation of this institution for teaching dentistry, the purely medical subjects to be taught in the Calcutta Medical College. We hope the Government will act on these recommendations at an early date.

The college, since its establishment in 1920, has turned out 149 dentists. Every one of them is carrying on a successful practice of dentistry in India or in the neighbouring countries. During the year under review we had 75 students on our rolls, of whom one was a girl. Twenty-five students passed the final examination of the college and received the Diploma. The students hail from all the Indian provinces. There is no dental registration law in any province of India restricting the practice of dentistry to qualified men. This fact has stood in the way of our progress. Unless we have some method of registration of dentists, there would be no incentive for students to take up a complete course of instruction in dental science.

So far we have been offering a three years' course in dentistry after matriculation from an Indian University. The Government Dental Education and Registration Enquiry Committee has recommended that the course should be one of four years and only I.Sc. passed students should be admitted. As to how soon it will materialize, it is difficult to say, but we are making arrangements that the recommendations of the committee may be given effect to without unnecessary delay.

With the exception of three full-time and two half-time members of the staff the rest are all honorary workers, drawing only a conveyance allowance. We express our thanks to all members of the staff for their work in this institution.

The cost per student per year works out at about Rs. 412. I understand the cost per student per year in the Calcutta Medical College works out at about Rs. 850. The reason why we are able to keep our cost so low is due to the system of honorary work prevailing in this institution. Lately there has been a lot of criticism of this method of work, but we see no other way out. Unless the State comes to our rescue with a generous grant, we have no other alternative. After a great deal of difficulty the Corporation of Calcutta has given us a donation of Rs. 2,950 but this has been earmarked for the Dental Hospital and a condition has been made that in return for this grant we should treat free of charge all Corporation Free Primary School children.

The present premises have become too small for our growing needs. About six months ago we selected a house in Prinsep Street with about 13 cottages of

land and were advised that after the alterations the premises could be utilized for our purpose. Accordingly we decided to buy the property and paid through our solicitors some advance money. Only a week or so ago we have been advised that the title of the said property is not quite clear, therefore we have to let that proposition go and look out for something more desirable. In any case, our removal to larger premises has become urgently necessary and we hope to move within the current year.

Our Dental Hospital is the only one in Calcutta where the benefit of both surgical and mechanical dentistry is available to the public. During the year under review the following work was done in the hospital by our students, under the supervision of the teachers.

Total number of outpatients	..	6,676
" " " surgical cases	..	113
" " " fillings inserted	..	1,466
" " " root canal treatments	..	329
" " " extractions	..	3,253
" " " prophylaxis	..	528
" " " artificial dentures supplied	..	261
" " " crown and bridge work	..	26

A large number of these are patients who would never have received any dental treatment nor had artificial dentures, were it not for this institution.

During the year under review six new dental pump chairs have been added, thus making our total available chairs in the dental clinic 23. In our present accommodation no further addition is possible. But if we have to increase our teaching facilities we must increase the number of our dental chairs.

The above abstract indicates that this institution is doing valuable pioneer work, at a remarkably low cost, and under considerable difficulties owing to lack of funds and inadequate accommodation. Dental registration is now existent in all the leading countries in the world and if the Calcutta Dental College is able to bring this about in Bengal it will earn the gratitude of the whole of India, for registration of dentists in the Presidency will no doubt be quickly followed by similar acts in other governmental areas and the practice of dentistry raised to the status it deserves throughout India.

THE KASHMIR MEDICAL MISSION OF THE CHURCH MISSIONARY SOCIETY. REPORT FOR 1934

In our notice of this hospital last year we gave an outline of its early history and in this we drew attention to the work of the two brothers Neve which began in 1882 by the appointment of Dr. Arthur Neve. In the annual report for 1934, just received by us, the announcement is made of Dr. Ernest Neve's retirement from active control of the institution, and we give below an abstract of his achievements in connection with this important work.

The chief event which we have to record in connection with our hospital this year is the retirement after forty-eight years' service of Dr. E. F. Neve.

In 1885, he graduated M.D. with gold medal and awarded the Goodsir Prize (£60). In 1886, he obtained the Fellowship of the Edinburgh Royal College of Surgeons and he left Edinburgh that same year and joined his brother, Arthur, in Kashmir. Then began a life partnership of splendid service for the sick and suffering poor of Kashmir. Between the years 1888 and 1896 the two brothers erected the whole of this hospital at a cost of less than £20,000 without any Government or other grant, a really fine achievement. The brothers worked together until 1915, a period of nearly thirty years. Dr. Arthur then went to the Great War, returning to Kashmir in 1919, and died in September of that year.

Besides the building of the whole of the present Mission Hospital, another notable work which the Neve brothers carried out was the founding, designing and building of the Kashmir Government Leper Hospital in 1891. Dr. Ernest Neve was Joint Honorary Superintendent of the Leper Asylum for a period of thirty-six years, during which time the institution increased in size and efficiency until it became one of the largest in India.

After well over half a century of medical and surgical practice, forty-eight years of which were in connection with the Kashmir Medical Mission, he retired on 31st March, 1934.

While quite retired from all medical and surgical practice, Dr. Ernest Neve's name is still retained as our Honorary Consulting Surgeon and he still gives us valuable help as Honorary Treasurer, and keeps in touch with the work by visiting the hospital twice a week to take services in the church and to preach in the wards and outpatient department.

From perusal of the report we note that the valuable work of the Kashmir Medical Mission is continuing with unabated energy though hampered in recent years by a decreased income.

Just about the time that the annual report arrived we received notice of a special appeal on behalf of this hospital because of serious loss of income both from a falling off in subscriptions from England and the loss of the consultation fees which Dr. Ernest Neve earned and paid to the hospital. The work of this mission hospital has always been outstanding among mission hospitals and we feel it would be a matter of regret if its work was seriously curtailed for lack of funds. Therefore we invite those of our readers who feel so disposed to send donations to the superintendent of the Mission Hospital, Srinagar, Kashmir.

REPORT ON THE PUBLIC HEALTH ADMINISTRATION OF THE PUNJAB DURING THE YEAR 1933. BY KHAN BAHADUR DR. K. A. RAHMAN, O.B.E., M.B., CH.B. (EDIN.), D.P.H. (LOND.), DIRECTOR OF PUBLIC HEALTH, PUNJAB, TOGETHER WITH THE REPORT ON SANITARY WORKS. BY D. A. HOWELL, M.I.C.E., SUPERINTENDING ENGINEER, PUBLIC HEALTH CIRCLE, PUNJAB

AN abnormal feature during the year 1933 was the severe flooding of three districts in the Ambala division, as a result of exceptionally heavy rains towards the end of the monsoon, with the result that mortality from fever was the highest of the decade.

Mainly for the above reason there was an increase in the provincial death rate from 24.7 to 28.2, the total number of deaths (660,542) being higher than in any year since 1926 when, besides high mortality for fever, there was also a serious plague epidemic. But, as the birth rate (1,042,624) showed a rapid leap upwards, being the highest yet recorded, the population increased from 24,189,503 to 24,571,585. A feature of the birth rate is, as usual, the excess of males over females, the proportion during the year under report having been 111.6 to 100 as against 111.9 in the preceding year. It is regrettable that the infant mortality rate, 192.55 per thousand, exceeded that of any year since 1926.

The special thanks of Government were conveyed to the Public Health Department and other officials in connection with the eminently satisfactory arrangements for the Sun Eclipse Fair held at Kurukshetra in the Karnal district in August 1933. The number of pilgrims exceeded five lakhs, many of whom came from cholera-infected areas. Fortunately, however, owing to careful dispositions for conservancy and water-supply arrangements, there were only three imported cases of cholera of which one was fatal.

Cholera.—Twenty districts were infected during the year, but mortality was unduly low, there being only 160 deaths and 238 seizures as compared with 614

deaths and 1,119 seizures in the year preceding. The success attending anti-cholera measures at the Solar Eclipse Fair has been mentioned above. It is thus apparent that the public health authorities' anti-cholera measures have now attained a very high degree of success.

Smallpox.—The mortality from this cause showed a considerable increase, the number of cases rising from 5,184 to 11,626, every district in the province being affected. It is explained in the report that this periodic rise every five years or so is inevitable, but that it is reassuring that the peak of the curve of the disease attained a considerable lower level than at the last similar epidemic in 1926 when 17,595 deaths were recorded. The strenuous efforts to combat the disease are described in detail in the report, and the Government is glad to learn of the co-operation of other departments, especially the education, with the public health department. The great majority of deaths from this cause were in small children, 3,534 being in children under one year of age and 5,332 in those between one and ten years. It is noticeable that the number of vaccination operations fell from 3.6 millions to 3.2 millions. These figures are for the years ending 31st March, 1933, and 31st March, 1934. It is explained in the report that in the previous period smallpox mortality was higher, and that this accounts for the larger number of vaccinations.

A decrease in the number of vaccination operations considerably increases the cost of each operation. Thus the decline in the number of successful operations performed by the staff of the local bodies raised the cost from Re. 0-2-0 to Re. 0-2-5 and in the case of the special vaccination staff of the public health department from Re. 0-7-4 to Re. 0-10-4.

Plague.—The plague mortality showed a further decrease falling from 2,003 to 1,789. This is gratifying, as fear was expressed in last year's review that the slight increase recorded for 1932 might portend a further rise. More than half of the mortality occurred in the Hoshiarpur district, which was one of the three districts mostly affected in the previous year. There was a considerable increase in the number of plague inoculations, which amounted to 133,743 as against 91,600, the greatest number of inoculations being in the district chiefly affected, Hoshiarpur.

Malaria.—As above remarked the climatic conditions of the province were particularly conducive to malaria, and mortality from fevers, which consisted mainly of this disease, was abnormally high (460,731). The strenuous efforts made to combat it, particularly by distribution of quinine and cinchona from tubes maintained in rural areas, are described in the report. In connection with the relief work in operation for a considerable period in Rohtak, Karnal and Gurgaon, an attempt was made to give a four days' quinine treatment course to patients, and appears to have been successful.

Leprosy.—An instructive leprosy survey was carried out during the year throughout the Kangra district, which is probably the only endemic area in the province, and also in part of the Lahore district including Lahore city. It was subsequently decided that Dr. Malhotra, the medical officer of the Leper Home, Palampur, should also be entrusted with the work of the district leprosy officer of the Kangra district. Seven outdoor clinics have been opened in the tahsil Dera Gopipur of that district where free treatment is administered, and it is confidently expected that the treatment of the disease in its early stages will ultimately lead to its eradication. In the Lahore district 22 cases were discovered, 19 in Lahore city itself; and of the latter, seven were residents of the United Provinces and 8 were beggars who have migrated from the United Provinces. Against these no action can at present be taken as the Lepers Act has not yet been extended to this province.

Ankylostomiasis.—The special investigation into the prevalence of hookworm infection in the Shakargarh

tahsil of the Gurdaspur district produced important results, and it was found that in some villages over 50 per cent of inhabitants were suffering from the complaint. A scheme for mass treatment was sanctioned, and is being carried out under the supervision of the epidemiologist. Probably this insidious disease is prevalent and unnoticed in other areas, and it is intended to extend the investigation to other districts.

Maternity and child welfare.—The number of health centres showed a considerable increase during 1933, the total number in the province rising to 52. Of these, 20 are maintained by the Red Cross Society, 13 by District Boards, 10 by voluntary associations other than the Red Cross Society and 9 by Municipal Committees; and 35 of them are in rural areas. Most of them during the year were inspected by the inspectress of health centres, who is also the principal of the Punjab Health School, and the work at each centre proceeds on the same lines as at the Punjab Health School centre. During the year the centres were visited by 11,264 expectant mothers for advice, medical aid being called for in 343 cases. It is also a matter for satisfaction that the number of *dais* under training rose from 1,405 to 1,779, and during the year 575 of these obtained the Indigenous *Dais'* certificate of the Punjab Central Midwives Board, and of 14,222 confinement cases attended by trained *dais* over 5,000 were supervised by lady health visitors.

Urban sanitation.—As in the previous year, financial stringency prevented Government giving grants for new schemes, and expenditure by local bodies on conservancy and drainage was also restricted. Rupees 1,75,000 were allotted to the sanitary board in connection with urban sanitary works, and this went towards works already in progress, but only Rs. 1,35,000 was actually expended.

A list of a large number of very important schemes continued or completed during the year is given in the report supplied by the Superintending Engineer, Public Health Circle. This part of the report also contains a detailed account of the inspection of water supply and conservancy works of local bodies throughout the province carried out by the public health staff; and in this connection the Government regrets that it has again been found by the department that some local bodies fail to maintain sanitary works in a satisfactory state. It is particularly unfortunate that this continues to be the case, in view of the enormous increase of sanitary works in towns during the last 13 years, since the Sanitary Engineer to Government (now Superintending Engineer, Public Health Circle), whose duties were previously advisory and consultative, undertook the actual construction of important sanitary schemes. Thus, the total value of public health engineering works, wholly or partly completed by the end of 1933, was about 350 lakhs, or three times the value of such work in 1920; the total horse-power of mechanical plant installed for sanitary works is about 8,000, or over twelve times as great as that of the plants existing in 1900.

Rural sanitation.—As in the case of urban sanitary schemes, there were no new rural water-supply schemes started, though work continued on all schemes already in progress. Under the ægis of the public health department about Rs. 56,000 were spent by district boards and villagers on the cleansing of wells and on the construction of parapets. An interesting account is given in the report of propaganda work and 'uplift' meetings held throughout the province. The work done in Ambala, Ludhiana and Ferozepore districts in particular was very considerable and, from the figures supplied in the report, it would appear that the condition of a large number of villages in those districts must have been vastly improved.

Conclusion.—The Government deeply regrets to have to record the death, after he had been in charge of the department for ten months, of Major R. C. Malhotra, I.M.S.; he was succeeded as Director of Public Health by Khan Bahadur Dr. K. A. Rahman.

Correspondence

FIRST TREATMENTS IN MEDICINE

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I shall be obliged if you will kindly publish in your next issue this mild remonstrance against your reviewer, K. V. K.'s wholesale condemnation of my recently published 'First Treatments in Medicine'.

To begin with, he is wrong in his statements. He says I recommend the use of carbolic acid for malaria and amœbic dysentery (implying I recommend it alone), and *make no mention of the efficacy of quinine or emetine*. I do no such thing, and I don't suppose any medical man in his senses would recommend carbolic acid by itself for such ailments, but, *combined with quinine*, as in the prescription given, *where quinine is specially included*, it is a very potent remedy, though K. V. K. may not know it, and has completely cured many cases. Why it should do so in such combination, when neither would alone, I do not positively state, but the efficacy of such combinations is common, as K. V. K. must be aware.

K. V. K. has apparently only scanned the preface cursorily. Let me quote: 'A certain amount of knowledge.....has been presupposed'. Every three years' student even must be aware of the value of emetine, antitoxin, arsenical and bismuth preparations, etc., but they are not always immediately available or procurable. The drugs I have mentioned usually are, and can be used as 'First Treatments', while others are being procured. Line 11, again of the preface, specially says that these treatments are 'suggested as a start', for those who may be befogged as to what to do. Competent practitioners like K. V. K., especially those living in large towns where any desired kind of medicine is available at once, can, of course, go ahead with any kind of treatment they know of and prefer.

The whole object of the book is to suggest, especially to beginners, a 'First Treatment' (not a complete or final one) in any particular case, and, as again suggested in the preface, 'with the almost endless treatments that exist for some complaints', only one or more have been given as a start, varying in some cases with the stage at which the patient is first seen. In some instances other treatments might, of course, have been given instead.

I really don't think K. V. K.'s predictions of disaster are likely to come to pass!—Yours, etc.,

G. F. ROWCROFT,
Colonel.

COONOR,
16th April, 1935.

[We have seen this book and on the whole are in agreement with our reviewer. We note that emetine, antitoxin, etc., have been omitted as being likely to be known by the most experienced practitioner and also probably not available immediately, whereas insulin without any information as to dosage or method of administration is given under the treatment of diabetes. We think the former drugs more likely to be easily obtainable than the latter, and that insulin is hardly to be classed as a 'first treatment' according to the author's definition.—EDITOR, I. M. G.]

TETRACHLORETHYLENE AND ITS EFFECT ON TAPEWORM

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Patient, a convict, came with the complaint of intestinal colic and progressive anæmia. He was passing proglottides *per anum* and had been losing weight. The stool was examined under the microscope and showed ova of *Tænia*.

He was given a course of extract *filiis liquidum* 1½ drachms in capsules in divided doses followed and preceded by purgatives. The result was a tapeworm of 3 feet length expelled without its head.

The patient did not improve and his complaint remained the same. After a fortnight, as directed by the superintendent of the Jail, a course of tetrachlorethylene 4 c.cm. with two ounces of saturated magnesium sulphate solution was administered and the patient expelled a worm 10 feet in length with its head.

Since then the patient is putting on weight and made an uneventful recovery. I should like to know if tapeworm has been treated with this drug previously. To my mind it appears to be very effective.—Yours, etc.

MD. AFSAR,
Sub-Assistant Surgeon In-charge
of District Jail Hospital.

JOREHAT, ASSAM,
25th April, 1935.

[Note.—Tetrachlorethylene has been tried on several cases of tapeworm infection at the Carmichael Hospital for Tropical Diseases, Calcutta, without apparent effect (*Indian Med. Gaz.*, Vol. LXVI, p. 667) but carbon tetrachloride has been found very good for removing these parasites (*Indian Med. Gaz.*, Vol. LXVI, p. 670).—EDITOR, I. M. G.]

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL C. E. PALMER, Officiating Inspector-General, Civil Hospitals and Prisons, Assam, is confirmed in that appointment, with effect from the forenoon of the 15th February, 1935.

The Viceroy and Governor-General has been pleased to make the following appointments on His Excellency's personal staff:—

To be Honorary Surgeons

Lieutenant-Colonel G. G. Jolly, C.I.E., *vice* Colonel A. H. Proctor, D.S.O., vacated. Dated 18th March, 1935.

Lieutenant-Colonel R. Hay, an Agency Surgeon, is posted as Residency Surgeon and Chief Medical Officer in Baluchistan, with effect from the afternoon of the 20th March, 1935.

Major J. G. Bird, an Agency Surgeon, on return from leave is posted as Civil Surgeon, Quetta, with effect from the 29th March, 1935.

The probationary appointment of the undermentioned officers is confirmed:—

Captains

R. L. Haviland Minchin.

W. G. Kingston.

J. Edis-Meyer.

T. K. White.

R. De Soldenhoff.

C. J. Hassett.

R. R. Prosser.

E. Parry.

W. G. Kennedy.

P. I. Franks.

B. F. B. Russell.

The services of Captain D. P. Nath are placed at the disposal of the Government of Bihar and Orissa for employment in the Jail Department, with effect from the date on which he assumes charge of his duties.

With reference to previous notifications in so far as the undermentioned officers are concerned their position on confirmation will be as shown below:—

Captain H. A. Ledgerd.
 Captain S. Ahmad.
 Captain C. C. Kapila.
 Captain W. W. Laughland.
 Captain T. F. O'Donnell.
 Captain J. White.

PROMOTIONS

Majors to be Lieutenant-Colonels

A. H. Shaikh. Dated 5th March, 1935.
 R. M. Kharegat. Dated 11th March, 1935.
 J. C. Pyper, O.N.E. Dated 15th March, 1935.

LEAVE

Major-General Sir Robert McCarrison, Kt., C.I.E., K.H.P., an officer of the Medical Research Department on foreign service under the Indian Research Fund Association, is granted leave pending retirement, for 5 months, with effect from the 18th March, 1935. His services are placed at the disposal of the Director-General, Indian Medical Service, from the same date.

Lieutenant-Colonel Stevenson, an Agency Surgeon, is granted 8 months' leave, with effect from the afternoon of the 20th March, 1935.

On termination of his appointment as Officer on Special Duty in the office of the Director-General, Indian Medical Service, Lieutenant-Colonel G. G. Jolly, C.I.E., Deputy Director-General, Indian Medical Service, is granted leave on average pay for 4 months and 4 days combined with leave on half average pay for 20 days, with effect from the 22nd March, 1935.

Major S. L. Bhatia, M.C., Professor of Physiology and Histology, and Dean, Grant Medical College, Bombay, is granted leave for 5 months and 24 days, with effect from the 4th June, 1935, with permission to prefix to the leave the College vacation from 8th April, 1935, to 3rd June, 1935.

RETIREMENTS

Lieutenant-Colonel R. G. G. Croly, on account of ill health, 4th February, 1935.

Lieutenant-Colonel F. C. Fraser, 15th February, 1935.

Lieutenant-Colonel R. B. S. Sewell, C.I.E., 5th March, 1935.

Lieutenant-Colonel F. Oppenheimer, 9th March, 1935.

Notes

THE Q-RAY ELECTRO-RADIUM COMPRESS

As soon as it was discovered that it was the combination of radio-activity and warmth that was responsible for cures at various Spas, experiments took place in an endeavour to combine these two healing agents, radium and warmth, in such a way as to make them available for those sufferers who, for economic reasons, were unable to travel. These experiments were eventually crowned with success.

In 1928 an International Radiological Congress was held in Vienna, to which came many professors and scientists to discuss their experiences in radium therapy. At this congress was demonstrated the first Electro-Radium Compress, the ordinary type which, for the first time, united in a simple, safe, portable and convenient form, the action of the rays emitted from radium with the action of warmth.

This apparatus is supplied by the Radium Electric Limited, 24, Grosvenor Gardens, London.

WATSON'S MICROSCOPE CATALOGUE

We have received a copy of Watson's microscope catalogue, parts 1 and 2. This contains the familiar items that are usually found in Watson's well-known catalogue, but it has been brought thoroughly up to date.

The chapters on the optical parts of the microscope have been completely re-written, and on page 17 is printed a table showing the initial and combined magnification of the various objectives and eyepieces, micrometric values and actual fields of view. They have given an introduction to condenser technique, while a very full description of the construction of their microscopes and full particulars of the unit design of the body tube, interchangeable parts, etc., will also be found. The Bactil, Patna and Royal models have been re-designed. The optical-bench system is now applied to all instruments, and the low power binocular microscope on pages 113 and 116 is worth special attention.

In the second part of the catalogue will be found an entirely new series of lamps, two interesting projectors, an insect holder, and a very full list of stains and reagents, all these being of British manufacture.

This catalogue is once more far more than an illustrated price list; it provides many items of great interest to all microscopists.

Publishers' Notice

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

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Original Articles

ARTERIAL VERSUS VENOUS BLOOD SUGAR*

ARTERIO-VENOUS SUGAR DIFFERENCE AS A CRITERION OF THE SEVERITY OF DIABETES

By J. P. BOSE, M.D., F.C.S. (Lond.)

(From the Diabetes Research Department, School of Tropical Medicine, Calcutta)

Historical.—It was in 1848 that Claude Bernard first started the theory that sugar was only present in the blood drawn from the hepatic vein and on the right side of the heart, and was not present in any other part of the circulating blood.

This was not seriously questioned until 1856 when Chauveau, having made extensive studies on blood-sugar estimation, came to the following important conclusions:—

(1) That sugar was present in all parts of the circulating blood.

(2) That the arterial blood contained more sugar than the venous blood.

(3) That the sugar content of the blood was constant and persisted even after prolonged fasting.

Chauveau's observations were corroborated and established by workers such as Frerich, Figuier and others.

The micro-chemical method of blood analysis was introduced by Bang in 1913 resulting in a widespread clinical application of *capillary* blood-sugar determination in quantities of 0.1 c.cm. only. Almost at the same time Lewis and Benedict described a method of blood-sugar analysis with 2 c.cm. of venous blood. Both of these methods, eminently practical and requiring small quantities of blood at a time, gave a great impetus to blood-sugar determination in the clinics of Europe and America. Bang's method was generally adopted in Europe while Lewis and Benedict's method was followed in America. The results of the blood-sugar studies by European and American observers, however, often showed discrepancies and disagreements and were followed by argumentative discussions and comments.

Introduction.—Having used both the capillary (arterial) and the venous blood for blood-sugar investigations during the last fifteen years, the author was puzzled in the beginning at the discrepancy in the results that were obtained. No satisfactory explanation at the time was forthcoming as to why there was a difference in

the results of the glucose tolerance test done on the same patient by the arterial and venous methods. It was not long, however, before the full significance of such difference was realized and attempts have since been made to turn this fact to practical usefulness.

The author has made a study of the distribution of sugar in the blood (both capillary and venous) of diabetic and non-diabetic subjects and, as a result of such study, the immense value of the determination of the arterio-venous sugar difference (A-V difference as it is called), either at the fasting stage or during active sugar absorption, as an important and reliable guide for the determination of the state of carbohydrate metabolism of the individual has, in his opinion, been established. The estimation both of the arterial sugar and the venous sugar in cases of diabetes mellitus will give a truer and better indication of the nature of the disease than estimation of the venous blood sugar alone, and the determination of the arterio-venous sugar difference will give a much better indication of the severity of the disease and the line of treatment to be adopted in individual cases, more particularly as regards the indications for insulin treatment.

The fasting levels of sugar in arterial and venous blood

The data which have been obtained as regards the fasting level of sugar present simultaneously in the arterial and venous blood in healthy normal subjects and in diabetic individuals, and as regards their arterio-venous difference, may be summarized as follows:—

In normal healthy individuals—(a) the average level of sugar content in the arterial blood was found to be 95 mgm. and that in the venous blood was found to be 92 mgm. per 100 c.cm.;

(b) the average arterio-venous sugar difference was found to be +3 mgm. per 100 c.cm. of blood. In no case was a negative arterio-venous difference obtained.

In cases of diabetes, mild, moderate and severe—(a) the average fasting level in the arterial blood in mild cases was 156 mgm. and in the venous blood 153 mgm., the arterio-venous difference being +3 mgm. per 100 c.cm. of blood;

(b) the average fasting level in the arterial blood in moderately severe cases was 355 mgm., and in the venous blood 358 mgm., thereby creating a *negative* arterio-venous difference of —2 mgm. per 100 c.cm. of blood;

(c) the average fasting level in the arterial blood in severe cases was 469 mgm., and in the venous blood 475 mgm., thus creating a marked negative arterio-venous difference of —6 mgm. per 100 c.cm. of blood.

From the above data it is clear—

(1) that as far as the fasting arterio-venous sugar difference is concerned, mild cases of

* A more detailed and systematic study on the same subject has been sent for publication in the form of a paper entitled 'Arterio-venous sugar difference in diabetes mellitus: Its value in adjudging the severity of the disease' in the *Indian Journal of Medical Research* and will appear in the July number of the journal.

diabetes do not differ materially from normal subjects;

(2) in moderately severe cases of diabetes, the sugar content in the venous blood exceeds that of the arterial blood, thereby creating a negative arterio-venous difference;

(3) the difference between the moderate and the severe cases of diabetes is a matter of the degree of arterio-venous sugar difference obtained, notwithstanding the height of the fasting level of sugar.

Though the determination of the arterio-venous sugar difference in severe cases of diabetes in the fasting state may give us some idea of the severity of the disease, a much more definite and clear idea is obtainable by studying the arterio-venous sugar difference after a glucose meal.

Effect of ingestion of glucose on the arterio-venous sugar difference

The data which have been obtained as regards the effect of ingestion of glucose on the arterio-venous sugar difference in healthy normal individuals and in diabetic subjects may be summarized as follows:—

In normal healthy subjects—

(a) the arterio-venous sugar difference is negligible in the fasting stage, the average being +3 mgm. per 100 c.cm.;

(b) after the glucose meal, the arterio-venous difference rises, the maximum being obtained at the end of one hour after the meal. In five cases, the peak was obtained in a half hour's time;

(c) the average arterio-venous difference obtained in the one-hour period was +35 mgm., the variations ranging from a minimum of +26 mgm. to a maximum of +45 mgm. per 100 c.cm. of blood;

(d) the arterio-venous difference rapidly decreases one hour after the glucose meal, coming almost to the post-absorption level at the end of two and a half hours.

In mild cases of diabetes—

(a) the fasting arterio-venous difference did not differ materially from the normal cases;

(b) after the glucose meal, the arterio-venous difference was much less marked than in the normal case, the greatest difference (+13 to +20 mgm. per 100 c.cm. instead of +26 to +45 mgm. as in normal cases) occurring at the end of one hour after the meal;

(c) the fall in the sugar content of both the arterial and the venous blood began at the end of one and a half hours (instead of one hour as in normal cases);

(d) the arterio-venous difference regained the original level at the end of two and a half hours.

In severe cases—

(a) the fasting arterio-venous difference was almost always on the negative side;

(Continued at foot of next column)

TEBETREN IN INDIAN STRAINS OF MALARIA

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B. SEN, B.Sc., M.B.

and

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ALTHOUGH for the last three hundred years quinine has enjoyed the reputation of being the best remedy for malaria, its administration is attended with certain drawbacks: (i) It has to be administered in large doses and for a prolonged period (10 grains twice daily for 10

(Continued from previous column)

(b) after the glucose meal, there were at least five cases in which the rise in the sugar content of the arterial blood exceeded that of the venous blood, thus converting the initial negative arterio-venous difference into a positive one, though of a small degree. The other cases retained the negative difference throughout the test.

From the above, it is reasonable to conclude that the magnitude of the difference between the sugar content of the arterial blood and the venous (positive arterio-venous difference) after glucose ingestion is the best indication of the rate of glucose utilization in the tissues. In diabetes, it should be remembered, the power of glucose utilization in the tissues is defective according to the degree of the severity of the disease. That explains why the degree of positive arterio-venous difference becomes less and less as the severity of the disease increases and, in the severe cases, even a negative arterio-venous difference is obtained, i.e., the venous sugar level rises higher than the arterial sugar. The reason for this is probably that there are times when the tissues are discharging more sugar into the venous blood than they are receiving from the capillary blood. The tissues lose the power of retaining the sugar that is stored in them and under the stress of the sudden flooding by extra sugar brought to them by the arterial blood, after a glucose meal, not only let it flow through without change but actually give up to the venous blood a little or a good deal of the sugar retained by them.

The above explanation receives some corroboration from the results of some of the experiments which the author is carrying out at present, viz, the action of insulin on the arterio-venous sugar difference in normal and diabetic subjects. It has been found, for example, that insulin not only helps the tissues to retain the sugar stored therein but often gives its aid in abstracting some of the sugar from the arterial blood, thus converting a negative arterio-venous difference into a positive one.

consecutive days), (ii) it is comparatively less effective in curing benign tertian infection, (iii) it has no effect on the crescentic gametocytes of *P. falciparum*, and (iv) it produces certain nervous symptoms and hæmoglobinuria in a small number of cases. Acton, Curjel and Dewey (1921) and Rennie, Acton and others (1921) observed that the alkaloids of cinchona bark other than quinine possess antimalarial properties and showed that 10 grains of cinchona febrifuge (a mixture of all alkaloids), given twice daily for ten consecutive days with a dose of an alkaline mixture half an hour before, cured fifty per cent of benign tertian infections, whereas with quinine the cure rate was never above thirty per cent.

The shortage of quinine during the Great War led to the synthesis of a number of antimalarial compounds and the drawbacks of the use of quinine, mentioned above, also stimulated research in this direction. Though these synthetic preparations cannot totally replace cinchona alkaloids yet, some of them have been shown to be just as effective and they undoubtedly serve as very useful adjuncts in the treatment of malaria. The synthesis of plasmochin by Schulemann in 1926 marked a distinct advance in this connection. Although further experience has shown the drug to be more toxic than was at first supposed, a total of 0.04 to 0.06 gm. spread over a period of two or three days produces a rapid and marked effect on the gametocytes of *P. falciparum* strains in India. They show signs of degeneration soon after plasmochin is started and totally disappear on the completion of the course described above. Any parasites left lose their viability and are incapable of further development in the mosquito host. Green (1929) has cured quartan malaria with plasmochin alone. Freiman (1929) as well as Stern (1929) have also treated malaria with plasmochin alone but our experience with Indian strains, however, is that the dosage necessary to produce any marked effect on these strains is large enough to produce toxic effects. Symptoms of poisoning, such as pain in the abdomen, cyanosis, cardiac irregularities, etc., have occurred with such doses, which necessitated the immediate discontinuance of the drug.

The next achievement in the chemotherapy of malaria was the synthesis of atebirin in 1929. Chemically this preparation is the dihydrochloride of an alkylamino-alkylamino-acridine derivative. Its action on malarial parasites closely resembles that of the cinchona alkaloids. Unlike plasmochin, however, it is a comparatively non-toxic drug. Certain untoward symptoms have been recorded while treating patients with atebirin but they are not serious. Comparative studies of atebirin and the cinchona alkaloids, so far as their effects on malarial parasites are concerned, have been made by various workers. The general opinion is that though atebirin can

not yet totally replace the cinchona alkaloids in mass treatment of malaria in this country, it is a very effective drug. It is particularly useful in those patients who are susceptible to quinine. Some also regard it as a prophylactic against malaria as it is slowly eliminated from the system.

Malarcan is another drug which has a definite action on malarial parasites. It is said to be a compound of a stereoisomeric base of methyl-eupreine with methyl-acridinium chloride and hydrochloric acid. It therefore appears to be a derivative of quinine or quinidine. Its action in some ways resembles that of atebirin but it has to be given for a longer period. The usual dosage is 9 to 12 tablets a day up to 80 or a 100 tablets. The only toxic symptoms which were noticed during the administration of the drug were flatulence, anorexia and slight ringing in the ears which disappeared with the stoppage of the drug.

The discovery of the antimalarial properties in acridine derivatives was utilized by Howard and Company in preparing 'tebetren' which they have recently introduced as a remedy for malaria. It is a combination of acridine and quinine derivatives with a derivative of cholic acid. The idea underlying this combination was to attain the maximum effect without the untoward symptoms which are usually manifested when quinine or atebirin are administered alone. Green tried this drug on a series of patients and stated that it destroys crescents. We took up the following investigation in order to study its effect on the Indian strains of malaria.

The investigation was carried out on a small series of twenty-two patients in the Carmichael Hospital for Tropical Diseases. Adult male patients giving a history of repeated attacks of malaria were admitted into the hospital under the senior author. Except in cases showing urgent symptoms the antimalarial treatment was withheld for a few days in order, firstly, to identify the species of the infecting parasites by means of daily blood examination and, secondly, to select only those cases which did not show any tendency to spontaneous recovery. Daily estimations of the number of parasites per c.mm. of blood were made during this period. Administration of tebetren was started when the parasite count was fairly constant for two or three days. Three tablets were given thrice daily for five consecutive days. The blood was examined daily for malaria parasites while tebetren was being administered and the effect of the drug was studied on (i) temperature, (ii) the sexual and asexual forms of parasites, and (iii) the time taken for their disappearance from the peripheral blood. Any untoward symptoms produced were carefully recorded. The patients were kept under observation for a fortnight after the treatment was completed and, if the blood examinations were negative, a

TABLE
PARASITE COUNT PER CUBIC MILLIMETRE.

PARASITE COUNT PER CUBIC MILLIMETER.																	
No.	Race, sex and age	Tempera- ture	DURING AND AFTER TREATMENT												Days of fever	Resultant effect on plasmodial infection	
			BEFORE TREATMENT			2nd day		3rd day		4th day		5th day		6th day			
			Species	Asex.	Sex.	Asex.	Sex.	Asex.	Sex.	Asex.	Sex.	Asex.	Sex.				
1	H. M., 20 ..	99°F.	B. T. M. T. Q.	+ Sc. +	Sc. 0 Sc.	+ Sc. +	Sc. 0 Sc.	Sc. 0 Sc.	Sc. 0 Sc.	Sc. 0 Sc.	0 0 0	0 0 0	0 0 0	3	Quartan persisted. (Hw. infection.)		
2	H. M., 29 ..	105°F.	M. T. Q.	Sc. +	0 0	0 Sc.	0 Sc.	0 Sc.	0 Sc.	0 Sc.	0 0	0 0	0 0	2	Quartan persisted. (Hw. infection.)		
3	H. M., 17 ..	102°F.	Q.	800	0	400	0	160	0	Sc. deg.	0	0	0	2	Cleared; relapsed on the 15th day after treatment showing B. T. (Hw. infection.)		
4	E. M., 33 ..	98°F.	M. T.	Sc.	0	Sc.	Sc.	Sc.	0	Sc.	0	Sc.	0	..	Crescents persisted. Took atebirin and plasmochin before admission.		
5	H. M., 18 ..	99.4°F.	B. T. M. T.	Sc. Sc.	0 0	Sc. Sc.	Sc. Sc.	Sc. Sc.	Sc. Sc.	Sc. Sc.	0 0	0 Sc.	0 Sc.	2	Crescents persisted. Relapsed on the 15th day after treatment.		
6	H. F., 16 ..	99°F.	M. T.	1,200	240	0	320	0	240	0	180	0	Sc.	2	Crescents persisted. Relapsed on the 4th day after treatment.		
7	H. M., 28 ..	100.4°F.	M. T.	3,060	0	2,250	0	Sc.	0	Sc.	Sc.	0	Sc.	3	Crescents persisted.		
8	H. M., 36 ..	100°F.	Q.	750	160	240	80	200	80	Sc.	Sc.	0	Sc.	2	Cleared.		
9	H. M., 20 ..	98°F.	B. T.	Sc.	Sc.	Sc.	Sc.	0	0	0	0	0	0	..	Originally B. T. and M. T. Blood showed B. T. immediately before treatment was started. M. T. found on 23rd day after treatment. Took quinine before admission.		
10	H. M., 20 ..	105°F.	M. T. B. T.	5,300 1,000	700 0	1,280 160	800 80	+	+	Sc. Sc.	+	0 0	0 +	2	Crescents persisted.		
11	M. M., 18 ..	102°F.	B. T.	2,800	0	1,300	0	400	0	0	0	0	0	2	Cleared.		

cultural examination was also done. No special precautions were observed during the course of treatment except that constipation if present was relieved with a mild purgative. The results have been analysed and are given in the table.

Perusal of the table shows that in cases of infection with *P. falciparum* the asexual forms are destroyed within three to five days, but the sexual forms remain unaffected (cases nos. 1, 2, 4, 5, 6, 7, 10, 12, 13, 16 and 21). In cases of infection with *P. vivax* both the asexual and sexual forms disappeared from the peripheral blood within three to five days (cases nos. 1, 5, 9, 10, 11, 15, 16 and 17). The effect of tebetren on both the asexual and sexual forms of *P. malarie* was much less marked and in cases nos. 1, 2, 3, 8 and 14 the parasites persisted for a comparatively longer period. In case no. 14 the plasmodia persisted for seven days after completion of treatment. The cure rates with this drug on the three species of parasites are as follows:—

P. vivax .. 6 out of 9 (66 per cent), one of whom left hospital on the 13th day after treatment.

P. falciparum .. 8 out of 12 (66 per cent), one of whom left hospital on the 5th day after treatment.

P. malarie .. 3 out of 6 (50 per cent).

The following cases are of special interest in this investigation. Case no. 3 was admitted with quartan infection, but the relapse showed benign tertian infection instead of quartan. Case no. 18 also had quartan infection but the relapse showed both quartan and malignant tertian. In the case of no. 9, *P. vivax* and *P. falciparum* were both present on admission but only *P. falciparum* was found when treatment was started; the relapse which occurred on the 23rd day showed *P. vivax* only. The explanation appears to be that cases nos. 3 and 18 had a latent benign tertian and malignant tertian infection respectively which could not be controlled by tebetren. Similarly in case no. 9 the malignant tertian infection had become latent by the time treatment was actually started, and possibly remained unaffected. These three cases show that this drug like others does not reach the parasites in the internal organs in sufficient concentrations to destroy them completely and when relapse occurred they became active and appeared in the peripheral circulation.

The untoward effects which were met with in a certain number of patients during the course of trials with tebetren were anorexia, a sense of uneasiness in the epigastric region and flatulence. One or two patients complained of some disturbance in sleep. Case no. 22 showed

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THE TREATMENT OF OBSTRUCTION OF LACRIMAL DUCT AND CHRONIC DACRYOCYSTITIS

By JADAVJI HANSRAJ, D.O.M.S. (Eng.)
L.M. & S. (Bombay)

Bombay

OBSTRUCTION of the lacrimal duct is generally due to chronic dacryocystitis and subsequent fibrosis, stricture or stenosis of the lacrimal duct. It is not necessary to give the pathological factors which bring about the condition, as they can be found in any textbook on ophthalmology. On the other hand I propose to discuss the treatment in some detail.

Treatment

The measures adopted to cure this condition are:—

- (1) Syringing the lacrimal sac with antiseptics or astringents.
- (2) Dilating the stricture by passing graduated probes through the lacrimal duct.
- (3) Excision of the lacrimal sac—
 - (a) by the usual-external method.
 - (b) by the intranasal method (the operation goes by the name of West intranasal dacryocystotomy).
- (4) Stricturectomy by Poulard's method.
- (5) Toti's or Dupuy Dutemps' operation—in other words establishing a permanent drainage of the lacrimal sac into the nasal cavity (dacryocysto-rhinostomy).

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sensitiveness to tebetren and the drug had to be stopped after the first day.

Summary.—Tebetren resembles quinine and atebirin in its action on Indian strains of malaria. It destroys the asexual and sexual forms of *P. vivax* and *P. malarie*, but only the asexual forms of *P. falciparum*. Its action on *P. malarie* is comparatively slower and less potent. Like atebirin it is not unpleasant to take, but the drug has to be given in much larger doses than atebirin. As compared with cinchona alkaloids the drug is much more expensive and appears to have no particular advantage over them.

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The advantages and disadvantages of the different methods as observed by me in my experience of thirty years are as follows :—

(1) *Syringing the lacrimal sac*

The only condition in which a radical cure can be brought about by this method is congenital stenosis or obstruction of the lacrimal duct in the newborn; and in those conditions in the adult in which the obstruction of the lacrimal duct is not complete. In cases of obstruction of the nasal duct in the newborn the cause is a tag of mucus getting impacted in the duct. In these cases syringing the sac with a mild antiseptic or even saline solution is sufficient to bring about a permanent cure.

In adults when the obstruction is not complete daily syringing of the sac keeps the condition in check for the time being but ultimately when the obstruction is complete, syringing the sac is practically useless.

In all other cases syringing the sac never brings about a cure.

(2) *Probing*

Probing has been resorted to as a means of curing this condition but in the experience of most surgeons including myself this is disappointing.

There is temporary relief in most cases, but in the long run the condition becomes worse and total obstruction of the duct is the result.

(3) *Excision of the sac*

This operation is resorted to by most of the surgeons in India as well as in Europe. If the operation is done well and if no piece of the sac is left behind after the operation cure is complete, but the after-effects are very annoying and cause discomfort to the patient. The continuous epiphora that we find in most of the cases is a source of permanent trouble.

(4) *Poulard's stricturectomy*

I have been doing this operation for the last eighteen months. Up to the present time I have done twenty and in eighteen cases the cure is complete. Only in one case I had to resort to excision of the sac as it was impossible to pass the stricturectomy knife into the lacrimal duct. In this case it was observed at the time of doing the excision that the thickening of the bone was so great that there was no passage left for the knife, not even for the smallest probe.

The advantages of this operation are that the sac is left intact and there is no epiphora.

The operation itself is comparatively simple as will be seen from the following brief description :—

Technique of the operation

(a) The inferior punctum is touched with a ten per cent cocaine solution to which a few drops of adrenaline chloride solution have been added.

(b) The skin over the lacrimal sac is touched with tincture iodine rectificatus.

(c) The eye washed with 1:5,000 perchloride of mercury lotion.

(d) A few drops of five per cent cocaine solution with adrenaline chloride injected into the sac after dilating the inferior canaliculus.

(e) Two per cent novocaine solution with a little adrenaline chloride solution injected into the sac in two places, viz, in the region of the fundus and near the lacrimal duct.

(f) The anaesthesia is complete after 10 minutes.

(g) Wash the sac with rivanol solution 1:5,000.

(h) Poulard's stricturectomy knife is passed through the inferior punctum and the inferior canaliculus is split open.

(i) Poulard's probe (no. 2) is forced through the duct. Care should be taken that no false passage is made.

(j) Poulard's stricturectomy knife is passed through the slit canaliculus into the sac and then through the duct. A turn of 90 degrees is to be given to the knife and the stricture in the duct is cut with the edge of the knife.

(k) The knife is taken out and probe no. 14 is passed through the duct.

If the stricturectomy has been properly done the probe will pass without any resistance. It is kept there for about three minutes.

It will be noticed at this stage that while it was found difficult to pass no. 1 or no. 2 probe before stricturectomy, probe no. 14 slips through with ease after stricturectomy.

(l) A drop of argyrol solution is put into the eye and a pad and bandage applied. The bandage is kept on for twenty-four hours only.

After-treatment

On the fourth day after the operation the sac is washed with rivanol solution 1:5,000 and two or three drops of ten per cent cocaine solution with a little adrenaline are injected into the sac.

Five minutes after the injection of cocaine a gum elastic bougie no. 14 is passed through the divided stricture and kept *in situ* for about two minutes.

If it is not possible to pass the bougie, the metal probe may be passed and kept there for about two minutes.

This treatment is repeated every fourth day for the first four treatments and then every sixth day for the next two treatments.

After six treatments the cure is complete.

Complications and sequelae

There are three important complications that may occur during the operation :—

- (i) False passage.
- (ii) Haemorrhage.
- (iii) Failure to pass the probe.

(i) False passage can be easily avoided if no undue force is used at the time of passing the first probe.

False passage leads to œdema of the parts and very rarely to cellulitis.

(ii) Hæmorrhage of any severity is very rare. I have seen it once and it was easily stopped by a pressure-pad and bandage.

(iii) Failure to pass the probe. This happened in only one case in which it was found subsequently while doing excision of the sac, that the bony growth was so great that there was osseous occlusion of the lower lacrimal passage.

(5) *Dacryocysto-rhinostomy* (as practised by Toti and modified by Dupuy Dutemps).

This operation is more radical and better results are claimed by the supporters. The only disadvantage about it is that it takes a very long time and perhaps it may be found difficult for those ophthalmic surgeons who have no practice of general surgery.

So far I have done this operation twice and the result was complete cure without any complication in both cases.

Dupuy Dutemps has published the results of 1,000 operations in *Annales Occulistique* of May 1933. His statistics show complete cure in 948 cases, partial failure in 24 and total failure in 28.

I will give a brief outline of the operation.

Preparation of the patient

Half an hour before the operation the mucous membrane of the nose is anæsthetized by passing about four probes with pledgets of cotton at the end and soaked in the five per cent cocaine solution. The probes are kept in the nose for fifteen minutes.

The skin over the lacrimal region is sterilized by the application of tincture iodine rectificatus.

The sac is washed and anæsthetized by putting a few drops of cocaine adrenaline solution in the sac.

The area of the operation is anæsthetized by infiltration anæsthesia using two per cent novocaine solution with a little adrenaline.

Operation

Incision.—A slightly curved incision is made about 13 millimetres internal to the inner canthus. The incision should be so designed, that one-fourth of it is above the internal palpebral ligament and three-fourths below it. The incision goes right down to the bone. By careful dissection the lacrimal sac is exposed and it is carefully detached from the lacrimal fossa, taking care that it is not opened. The adjacent part of the bony outer wall of the nose is exposed and, with an elevator, the periosteum is pushed aside.

The next step is to make an opening in the bony outer wall of the nose. With a special

(Continued at foot of next column)

THE RATE OF DEVELOPMENT OF HOOKWORM EGGS

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THE object of this note is to impress on workers in the tropics the need of recognizing that hookworm eggs undergo comparatively rapid development in an ordinary stool. This is no doubt quite well known to the majority of persons examining stools for hookworm eggs as

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chisel and mallet, the bone is chiselled out and removed. The soft velvety reddish-looking mucous membrane of the nose is exposed. The opening in the bone can be enlarged by a special punch-foreeps.

The next step is to make an incision in the sac and a corresponding incision in the nasal mucous membrane.

Then the posterior lip of the nasal incision is sutured to the posterior lip of the sac incision; for this purpose two needles (Dechamp's and Reverdin's) are used.

The posterior lip of the incision in the nasal mucous membrane is seized with a suitable forceps and the Dechamp's needle armed with fine catgut is passed through the flap. When the needle is well out, one end of the suture is drawn out with a forceps; in this way about three sutures are passed. Then the Reverdin's needle is passed through the posterior lip of the sac incision and the loose end of the catgut suture is tucked in the needle and drawn through the sac flap. In this way all sutures are drawn through the sac lip. This unites the posterior lips of both the parts.

Similarly three or four sutures are passed through the anterior lips.

Sutures are tied and cut short and a two per cent mercuricchrome solution is applied.

The skin incision is sutured with silk or silk-worm gut.

A pad and bandage are applied and the patient allowed to go home.

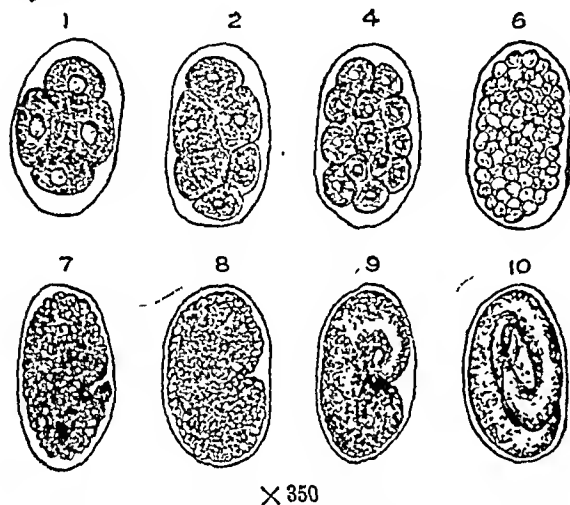
After-treatment

After-treatment is practically nil, the dressings are changed on the fourth day and again on the eighth day after the operation, when the superficial sutures are removed.

The cure is complete in the majority of cases. If it is found that the passage between the sac and the nasal mucous membrane is not free a Weber's knife is passed through the slit punctum and then through the passage made by the operation.

Suppuration or any other complication is unknown provided thorough asepsis has been observed.

a routine, and these observations will accordingly be considered superfluous by many, but after several years of teaching at the Calcutta School of Tropical Medicine the writer considers this fact well worth emphasizing, because it is surprising how many students who have had considerable experience will maintain that an egg cannot be of hookworm origin if it contains more than four cells—the old textbook description. As a matter of personal experience it is the exception to find hookworm eggs to contain only four cells in stools examined in my laboratory.



Camera lucida drawings of the principal stages of development of hookworm eggs.

The following observations were made on stools passed by patients in the Carmichael Hospital for Tropical Diseases, where the time they were passed was noted so that the actual amount of time before they were examined could be accurately determined. It is felt that giving the exact time in this way will impress the rate of egg development on readers more forcibly than vague references to the space of time involved.

The work was carried out in April and May when the weather is hot; probably at a colder time of the year the development of eggs would be not quite so rapid, but in the average tropical climate without great seasonal temperature variations, this factor would not have a very marked influence.

The complete stools were sent to the laboratory and a sample taken and placed in a 'D. C. F.' tube. No special precautions were taken to scrape off the surface of the stool where the development of eggs would be most rapid, but a portion of feces was picked up on a small spatula plunged deeply into it so that most of the eggs must have come from well below the surface.

An ordinary D. C. F. preparation, using saturated salt solution, was made and this was immediately washed off into water to prevent the strong salt acting on the eggs and probably

killing them. The eggs so obtained were placed on a slide under a coverslip which was ringed with vaseline to prevent evaporation and to permit of examination from time to time over a prolonged period. A few control observations were made with some of the stools, using sugar solution as well as salt. This was done to ascertain if the short time that the eggs were in saturated salt solution had any effect through the exertion of osmotic pressure, as this does not operate in the case of sugar. There was no apparent difference in the early development of eggs which had been collected by salt or sugar solutions so it is probable that for the short time it was in contact with the eggs the salt solution had no deleterious influence.

As a means of readily understanding the rate of development of eggs the following stages have been arbitrarily chosen and each stage has been given a numerical value. The principal stages are also shown in the accompanying figure.

1. Morula with 4 cells.
2. Morula with 6 to 10 cells.
3. Morula with 12 to 16 cells.
4. Morula with 16 to 24 cells.
5. Morula with 32 or more cells.
6. Mulberry, stage A.
7. Mulberry, stage B.
8. Kidney-shaped embryo.
9. Tadpole-shaped embryo.
10. Fully developed embryo in egg.
11. Embryo hatched out of egg.

It will be noticed in the table that the numbers of eggs recorded in the various observations are variable; this is because the numbers of eggs collected from different stools varied considerably, and after this they were washed into small tubes in water and then as many as possible were drawn up in a pipette and transferred to a slide.

It will be seen that 21 stools from five individuals were examined and that only a small proportion of the eggs recovered showed as few as four cells. The actual percentage in both the first and second series of examinations was only between eleven and twelve per cent of all the eggs seen. In one instance two apparently fully embryonated eggs were found in just over five hours after the stool was passed, and in another instance six larvae were found hatched out in a slide preparation that had been put up and ringed with vaseline three hours previously, the stool having been passed for ten hours, when the free larvae were seen. On the whole, development appeared to be somewhat more rapid in eggs that had been removed from the stool by D. C. F. and then left in water, than it was in eggs left in stools. It was also noted that the development of eggs from day to day in stools from the same patient showed great variation in rate, but as far as this investigation went there was no indication as to the cause of this.

(Continued at foot of page 371)

TABLE

Case number	Date	Time stool passed	1ST EXAMINATION										2ND EXAMINATION											
			Time examined	Stages of development										Time examined	Stages of development									
				1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8	9	10	11
D. 6 ..	19th April	2 a.m.	12 noon	1	4	5	3	..	..	1	..	..	..	2	4	3	..	..	..	..	..	..	..	..
D. 6 ..	20th April	2-45 a.m.	12 noon	3	15	2	3	..	1	..	..	..	..	3	9	3	..	..	..	..	..	..	..	..
D. 6 ..	21st April	5-30 a.m.	12 noon	5	4	7	1	2	1	..	..	..	..	2	16	..	4	1	..	7	..	..	..	..
D. 6 ..	2nd May	9-30 a.m.	12-30 p.m.	7	18	1	1	1	1	1	..	..	..	5	2	2	3	3	1	1	1	..	2	..
D. 6 ..	3rd May	5-15 a.m.	12 noon	9	16	5	..	..	..	..	..	..	..	6	12	2	..	..	..	..	..	..	..	..
O. 62 ..	19th April	5-30 a.m.	12-30 p.m.	..	4	5	5	1	..	..	..	..	..	..	3	8	3	2	1	1	2	1	..	..
K. 17 ..	19th April	12-15 a.m.	12-45 p.m.	..	1	2	2	..	1	2	..	..	..	..	3	5	1	..	1	3	..	..	..	..
K. 17 ..	20th April	5-15 a.m.	12-15 p.m.	..	21	..	..	..	2	7	..	..	..	3	21	4	..	..	2	..	..	..	..	..
K. 17 ..	21st April	5-30 a.m.	12-30 p.m.	..	2	14	9	1	2	2	..	..	..	..	1	6	11	1	2	4	4	1	..	..
K. 17 ..	28th April	6-30 a.m.	11 a.m.	3	14	8	..	..	2	3	..	..	..	2	14	10	2	..	1	1	..	..	..	..
K. 17 ..	4th May	5-15 a.m.	12 noon	..	11	9	4	2	1	1	2	..	..	*1	11	9	..	..	..	3	..	..	6	..
K. 17 ..	5th May	5-20 a.m.	11-20 a.m.	1	15	6	1	..	3	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
K. 17 ..	6th May	5-30 a.m.	12-15 p.m.	2	9	7	..	1	1	..	..	..	..	*..	..	..	..	2	8	10	..	..	..	..
K. 17 ..	9th May	6 a.m.	11-30 a.m.	1	10	15	3	..	..	..	..	..	..	1	7	11	4	5	1	2	1	..	..	..
K. 17 ..	11th May	5-15 a.m.	11-15 a.m.	1	12	12	3	1	..	1	..	..	..	*..	..	..	..	..	12	18	..	..	..	..
D. 3 ..	12th May	10-45 p.m.	11-30 a.m. 13th May	..	10	5	1	..	..	1	1	1	1	..	8	2	1	1	1	..	2	..	..	..
D. 3 ..	16th May	6 a.m.	11 a.m.	5	14	4	..	..	..	3	2	1	..	..	..	4	5	..	..	3	1	2	..	..
D. 3 ..	18th May	5-30 a.m.	11-30 a.m.	1	11	8	..	..	..	..	..	..	..	*..	..	..	..	4	14	2	..	..	..	..
H. 6 ..	19th May	5-30 a.m.	11-30 a.m.	2	10	..	..	..	..	..	..	..	..	11	3	4	8	2	2	1	..	..	..	..
H. 6 ..	23rd May	5-15 a.m.	11 a.m.	13	5	..	..	..	..	5	..	..	..	*..	..	..	..	..	4	16	3	..	..	..
H. 6 ..	25th May	6 a.m.	12 noon	5	10	5	2	2	3	3	..	..	..	*..	..	..	..	..	..	27	3	..	..	..

Note.—The figures in the columns under 'Stages of development' represent the actual number of eggs seen in each stage.

* The slide that was examined in the morning was examined again in the afternoon. All the others examined in the afternoon were freshly made preparations taken from the stool.

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 * The slide that was examined in the morning was examined again in the afternoon. All the others examined in the afternoon were freshly made preparations taken from the stool.

EWING'S SARCOMA

A CLINICAL AND PATHOLOGICAL STUDY OF A CASE

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and

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THOUGH there are probably some references to this type of neoplastic growth in the older literature, it was only in the year 1920 that Ewing separated it from the general mass of malignant tumours of bone, on the basis of morphology and arrangement of the proliferating cells. The tumour has been called by various names: endothelial myeloma, Ewing's tumour, diffuse endothelial myeloma. Since Ewing's original description, Connor (1926), Codman (1926) and Kolodony (1927) have collected, described and reviewed many cases of this nature and have established this condition as a distinct clinical and pathological entity. That Ewing's sarcoma is by no means a rare condition is shown in a recent review of cases from Johns Hopkins Hospital, in which it formed 15 per cent of all the malignant bone tumours (Geschickter and Copeland, 1931).

Recently we had to report on a specimen removed at the General Hospital by Lieutenant-Colonel K. G. Pandalai, M.S., from a growth of the thigh. This was diagnosed as Ewing's sarcoma by us and it forms the basis of this paper and affords an opportunity for discussing tumours of this nature which as far as we are aware have not been reported in India before.

*Report of case**Clinical history*

The patient, a Hindu male, aged 35 years, was admitted into the General Hospital, Madras, on 11th November, 1934. His chief complaint was a painful swelling in the left thigh. He first noticed it as a small lump which gradually increased in size. The pain had also increased and at the time of admission was continuous, with exacerbations.

Physical examination

There was a soft, tender swelling on the anterior aspect of the middle third of the left thigh. There was no definite margin so that the growth tended to merge imperceptibly into the surrounding healthy tissue. It was hot to touch and the overlying skin was not freely movable. The swelling could not be moved freely in the transverse direction and in the longitudinal direction it could not be moved at all. The inguinal glands were neither enlarged nor tender. The knee joint could not be completely flexed.

(Continued from page 369)

It seems clear from this investigation that a large number of cells in an egg or even the presence of a fully developed embryo is not incompatible with hookworm infection even when stools have only been passed a few hours, especially in the warm weather.

There was a slight fever during his stay in the hospital.

Blood examination was as follows. Total number of leucocytes 9980 per cmm, of which the polymorphonuclear leucocytes were 80 per cent, monocytes 8 per cent and lymphocytes 12 per cent.

A roentgenogram of the left femur taken on 12th November, 1934, showed a distinct widening of the marrow cavity in the middle third of the shaft from destruction of the bone by the growing tumour. There was also a slight expansion of the shaft at the site of the tumour with a slight degree of periosteal reaction. The separation of the cortical part of the bone into longitudinal lamellae is clearly seen in the x-ray photograph (figure 1). The most frequent site of metastases being the lungs—these were x-rayed but did not show any deposits.

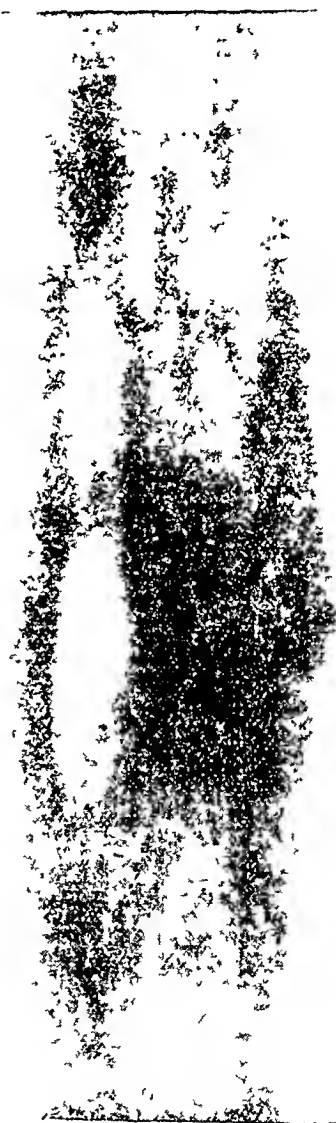


Fig 1—Roentgenogram of the shaft of the left femur taken before treatment. Note the widening of the medullary cavity and areas of rarefaction in the cortical bone with some periosteal reaction.

The growth was treated with a radium pad (40 mgm) on 23rd November 1934, which was removed on 14th December, 1934. The total dose given was 20,160 mgm. hours.

Another radiogram (figure 2) was taken on 7th December, 1934, after a course of irradiation and this showed a marked sclerosis both in the shaft and periosteal region at the site of the original tumour, and the honeycombed appearance of the bone was no longer visible.



Fig. 2.—Roentgenogram after irradiation shows marked sclerosis of the shaft and periosteal region.

Naked-eye examination.

The small piece of tissue sent to us was greyish white in colour and of a very soft consistency.

Microscopic examination.

Tissues for microscopic sections were fixed in 10 per cent formalin and in Zenker's fluid and these were embedded in paraffin. Sections were stained with Ehrlich's haematoxylin and eosin, by Leishman's stain, van Gieson's method, and Foot's silver impregnation method. The oxydase reaction was used to determine the presence of the granules in the cells.

A section of the tissue under low power showed a more or less diffuse mass of relatively large cells closely packed together (figure 3). There was no trace of the normal structure of the bone marrow. Here and there were seen round or oval clear spaces containing small collections of cells. Large areas of necrosis were seen in the section and there were also other areas where the cells appeared to have undergone a sort of hyaline or hydropic degeneration. Strands of pink staining hyaline tissue were seen to traverse the section and enclose islands of tumour cells but these, on examination under the high power of the microscope, turned out to be the walls of the blood vessels, many of them containing red cells. There was no trace of osseous or osteoid tissue anywhere in the section.

Under the high power (figure 4) the most predominant type of cell was a moderately large, mostly spherical sometimes irregularly polyhedral cell showing coarse cytoplasmic processes which in less dense sections were seen to intercommunicate with one another. The cytoplasm was scanty, stained very lightly with eosin

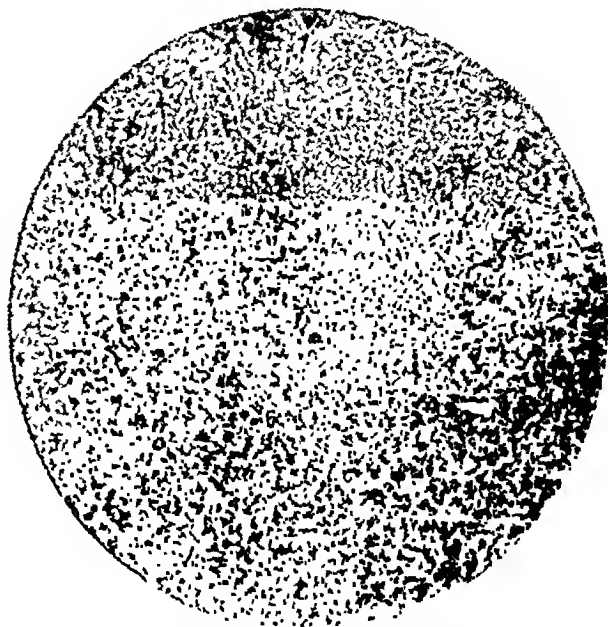


Fig. 3.—Note the diffuse collection of cells. The clear spaces containing groups of cells are scattered throughout the section.

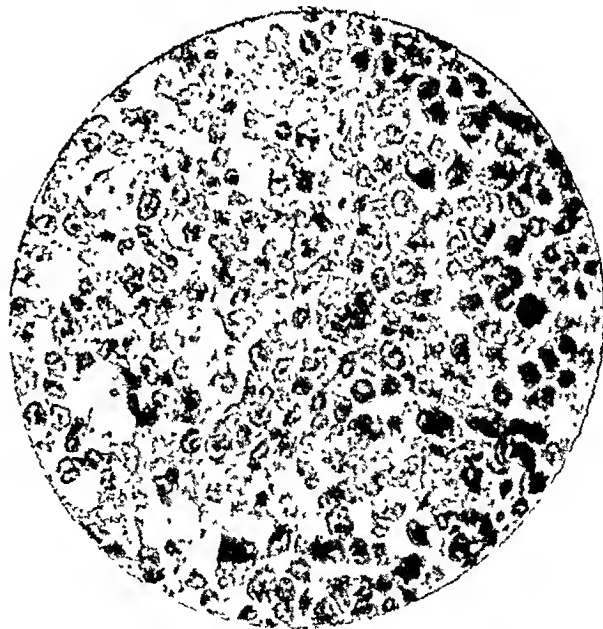


Fig. 4.—Same under high power. The cells are large polyhedral with coarse cytoplasmic processes. The cytoplasm is scanty and vacuolated. Note the hyperchromatic nuclei and a few cells in mitosis and one giant cell in the centre. The intercellular substance is absent.

and was vacuolated giving rise to a reticulated appearance. The outlines of the cells were irregular. The nucleus was relatively large oval, spherical or slightly elongated. Many of the nuclei were hyperchromatic and vesicular with a distinct nuclear membrane and showed scattered granules of chromatin. The cells bore some morphological resemblance to reticular cells. Cells with uniformly dense nuclei were also common. Some of the vesicular nuclei showed an indentation on

one side, and nuclei showing mitotic figures were abundant. There was a considerable variation in size, shape and staining reactions of the nuclei though the cells were more or less uniform in size. A noteworthy feature was the absence of intercellular substance. No characteristic arrangement of the proliferating cells was observed and they were diffusely scattered all over the section.

On a closer examination of the clear spaces under the high power, they were found to be devoid of any definite endothelial lining and they contained a number of the tumour cells along with other types of cells. Some of the cells seen in the clear spaces were small, round with a moderate amount of strongly eosinophilic cytoplasm and dense round nuclei resembling normoblasts. Cells of this description were also seen scattered elsewhere in the section. Besides these cells, there were a few giant cells which were both mononucleated and multinucleated, the latter were of the megakaryocytic type with vesicular nuclei. Plasma cells, small lymphocytes, eosinophilic cells and polymorphonuclear cells were altogether absent.

Sections impregnated with silver by Foot's method failed to reveal the presence of reticular fibres. Van Gieson's method did not show any collagen fibres except in the walls of the blood vessels. Frozen sections stained with Sudan III showed numerous fat globules of varying size in the tumour cells.

Blood vessels were abundant and well developed. The clear spaces containing tumour cells and also nucleated red cells as described above may possibly represent blood vessels of an embryonic type.

Diagnosis.—Ewing's sarcoma.

Comment.—The clinical features, namely the intermittent pain which later became continuous, the low fever and the typical skiagram with rarefaction and the site of the tumour (middle of the shaft of the femur) and the response to radium therapy, are all very suggestive of Ewing's sarcoma.

Ewing's sarcoma is a disease of early life. Of 65 Ewing's sarcomata in the material collected by Geschickter and Copeland, 58 cases were observed in patients of the age between 4½ and 25 years and only one case after the age of 40. The oldest person whose age was reported in this series was a woman aged 44. Connor has however reported a case in a patient aged 60. The age of our patient was 35 years. Multiple myeloma however occurs in the fourth and fifth decades of life.

Though a history of trauma is generally available we failed to elicit any such information from our patient.

The intermittent pain following trauma with signs of inflammation simulate closely the clinical symptoms of osteomyelitis of a sub-acute nature.

Ewing's sarcoma differs greatly from other common bone tumours in its location. The site of predilection in the case of Ewing's sarcoma is the shaft and not the end of long bones as is the case with osteogenic sarcoma. The giant cell tumour occurs usually in the epiphysis and multiple myeloma in the flat bones.

Histologically, the present case can be readily distinguished from inflammatory conditions, such as osteomyelitis, syphilis and tuberculosis of the bones. The uniformity of cytology and the absence of osteogenesis and intercellular

material separates it from osteogenic sarcoma. There are good reasons for not regarding this case as multiple myeloma. In the first instance, it is single. The neoplastic cells are not of a myeloid nature as shown by the oxydase reaction nor do they resemble lymphoid cells. A noteworthy feature is the absence of Bence-Jones' proteins in the urine.

Histogenesis.—We may now consider the question of the nature and origin of the proliferating cells in this case. It is difficult to trace the origin of the neoplastic cells in the absence of an opportunity to study the earlier stages of the neoplastic process. But in one or two of the cases in the Registry of Bone Sarcoma of the American College of Surgeons minute foci of tumour cells were seen to be arranged perivascularly in the Haversian canals and it was suggested that these arose from the adventitial cells (Kolodony, 1927). It was, however, not clear whether the cells originated in that situation or were brought there by lymphatics. Ewing (1924) assigned the cells of this tumour to some endothelial category and remarked: '...it may be that the interpretation of endothelium may have to be widened to include this group. I do not think they arise from blood or vascular endothelium. They may possibly arise from the perivascular lymphatic endothelium'. Connor (1926) suggested that the cells originated from the reticulo-endothelial system. As adventitial cells form part of this system this view is in conformity with that of Kolodony. Morphologically, the cells resemble the reticular cells, but a great many of them lacked their typical structure. As a rule, the reticular cells are more elongated with an abundant cytoplasm showing engulfed particles such as erythrocytes, degenerated cells, etc., but in this case the cells are more spherical and the cytoplasm which is small in amount does not show any evidence of phagocytic activity. Moreover, under normal conditions, most of the cells are intimately connected with reticular fibres. We have already pointed out the absence of argentophil fibres. All these variations from the normal structure of the reticular cell can be explained if it is assumed that the proliferating cells are embryonic in type. A cell has two main functions, those of growth and work, and it is well known that the cells of malignant growths lose their physiological function and devote themselves entirely to growth. That the cells of the tumour in the present case are malignant and embryonic in character is indicated by the extreme variation in size and shape and hyperchromatism of the nuclei which also show abundant mitosis and the relatively small amount of cytoplasm compared with the nucleus; also the phagocytic activity and production of reticular fibres representing as they do the physiological activity of the cell it is not unreasonable to assume that they are inhibited by the growth activity. The tendency

to the formation of spindle cells is also not a very prominent feature and may be explained in a similar way, that is to say there is no differentiation of the proliferating cells into other cell types. In the more differentiated type of reticular cell sarcoma, it is common to find an increased amount of reticular fibres and spindle cells.

The presence of fat globules in the cells possibly indicates a degenerative change in the cytoplasm.

The cell characters bear a superficial resemblance to the large lymphocytes. The outlines of the neoplastic cells in this case are however more irregular than those of the lymphocytes and the cytoplasm is reticulated.

The term endothelioma as applied to Ewing's sarcoma is misleading and has led to great confusion in the past. The term endothelioma should preferably be restricted to those tumours the cells of which originate from the true vascular endothelium and show more or less well-developed angioblastic properties. The reticular cells differ fundamentally in their nature and developmental potencies from those of true vascular endothelium. For this reason we consider the term endothelioma unsatisfactory and as we are inclined to believe that the tumour arises from the reticular cells it would be preferable to call it '*reticulum cell sarcoma*'. Geschickter and Copeland were unable to discover any histological resemblance between Ewing's sarcoma and the endotheliomas in their collection and they came to the conclusion 'that osteolytic endothelial myeloma of Ewing was neither primarily osteolytic nor medullary nor endothelial'. One is not surprised at this lack of similarity as the histogenesis and the cytology of the two conditions are different; for in the case of endothelioma the proliferating cells are those of vascular endothelium with angioblastic properties, whereas in Ewing's sarcoma they are reticular cells. If on the other hand one compares Ewing's sarcoma with tumours of reticular origin of other tissues, e.g., lymph nodes, the similarity between the two conditions is at once obvious. From the clinical standpoint also we may mention that true endotheliomas do not respond to irradiation which is in marked contrast to the extreme sensitiveness of Ewing's tumour. Indeed this feature is so characteristic that Ewing used it originally to differentiate it from other malignant tumours of bone.

Codman's view that the tumour is an undifferentiated form of osteogenic sarcoma is not generally accepted for various reasons. Osteogenic sarcoma is, as a rule, highly malignant, and the more embryonic tumour of this nature would naturally be much more rapidly fatal. But Ewing's tumour progresses comparatively slowly. It also differs from osteogenic sarcoma in certain other clinical features such as fever, the slow intermittent onset, the site of origin,

and the high incidence of secondary growth in the bones and the rapid initial response to irradiation. Considering the morphology of the cells and their marked osteolytic properties it is difficult to attribute the origin of this tumour to the osteoblasts.

Site of origin.—The question whether the tumour arises primarily in the bone marrow or in the subperiosteum or endosteum has been discussed at great length by Geschickter and Copeland (1931). According to these writers the elliptical area of shaft involvement with the bulk of the tumour lying subperiosteally is unlike the medullary tumours which are centrally situated and are of spherical contour. This elliptical involvement as seen in a skiagram can be explained as being due to a central tumour absorbing the bone, and displacing the weakened shaft outwards with simultaneous formation of new bone by the periosteum and it is conceivable that if x-ray pictures were taken in the early stages of Ewing's tumour one would find central spherical shadows without any elliptical involvement of bone indicating medullary origin. They also deny that there is early destruction of bone with a widening of the medullary cavity and that fractures are common. But other authors, Ewing for example, regard these occurrences as common. In the present case the x-ray picture shows evidence of expansion of the marrow cavity and the honeycombing of the shaft pointing to the osteolytic nature of the tumour. It is no doubt true that Bence-Jones' protein is usually found in cases of medullary tumours but much importance cannot be attached to this finding. The facts at our disposal do not enable us to point out conclusively the exact site of origin of this tumour. But we are inclined to believe that the tumour arises probably from the reticular cells, and as these cells are present both in the medulla and the cortex there is no reason why it should not arise in both these situations. It would thus be possible to reconcile the divergence of opinion as to the site of origin of the tumour as some of the tumours might arise from the medulla and the others in the cortex from the endosteum or periosteum.

Summary

A case of Ewing's sarcoma arising from the femur of the left side in a man aged 35 years is described. Though the task of tracing the derivation of the neoplastic cells is difficult it is suggested that they arise from the reticular cells on the basis of their morphological and structural characters. If this view be accepted, reticulum cell sarcoma would undoubtedly be a more suitable designation for tumours of this nature from the standpoint of histogenesis than endothelial myeloma. The question of the exact site of origin of the tumour is also discussed with the conclusion that it may arise in the

(Continued at foot of opposite page)

CALCINOSIS CUTIS

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Introduction

NODULAR formations in the corium due to deposit of lime salts are rather an uncommon form of primary skin lesion, though abnormal deposits of calcium salts in the various tissues of the body secondary to long-standing inflammatory lesions are a frequent occurrence. These are commonly found in old lupus nodules, in arterio-sclerotic patches, in caseous tuberculous nodules and sometimes in chronic lesions following a pyogenic infection, such as calcification of the pleura. Then again, there are many cases of calcification described in the literature, occurring as secondary to fat necrosis, to which reference is made later in this paper.

In this paper, we are more concerned with calcification occurring as a primary lesion in the skin or the subcutaneous tissues. This type of lesion, though of much less frequent occurrence, has nevertheless been described in the literature from time to time and a considerable amount of work has already been done on the subject. The ætiology of this condition, however, still remains obscure. The two cases of primary calcinosis cutis described in the present paper, which came under our observation in the course of a few months, and which presented some features of unusual interest, appear to us to be worthy of record. The result of our investigation showed that, at least in one of the cases, though the defect in calcium metabolism was important in causing the lesions, endocrine disturbance, more particularly a lowered function of the anterior pituitary, also played a not unimportant part in either causing or aggravating the condition.

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medullary as well as the cortical part of the bone. A clinical study of the case including x-ray pictures before and after irradiation is also presented.

We wish to thank Lieut.-Col. K. G. Pandalai, I.M.S., for the clinical notes of this case and Capt. T. W. Barnard, Director, Bernard Institute of Radiology, for the x-ray photographs.

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Whether the endocrine disturbance is primary or secondary needs further research.

Historical review

Fred Slare (Becker, 1924) inaugurated the chemical study of 'stones' in the human body, thus differentiating true bone formations from the various calcifications and deposits of specific salts. His observations were confirmed by Boerhaave (Becker, 1924). Prior to their work, any bony or stony mass in the body, regardless of its origin, nature, or location, was called a 'stone', and if it was beneath the skin, it was designated as a skin stone.

The first authentic report of calcinosis of the skin was described by Weber (1878). This condition was associated with scleroderma, and Weber interpreted the condition as a form of gout. In the monograph published by Lewen and Heller (1895) there are descriptions of six cases of calcareous deposits in the skin and subcutaneous tissues. Several similar cases also appear in French and Italian literature under the title 'Profichet's syndrome' (1900). Klotz (1905) made rather extensive studies on the process of pathological calcification. Lhermitte (1910) described a case of generalized subcutaneous calcification of unknown ætiology. Thibierge and Weissenbach (1911) described a case of calcinosis of the skin combined with scleroderma and sclerodactylia. Hunter (1913) also described two similar cases.

Within more recent times, the paper written by Becker on osteosis cutis contains an excellent review on the subject. Weidman and Schaffer (1926) have described in complete detail a case of calcification of the skin including the epidermis, with extensive bone resorption. These authors support Klotz in the hypothesis that 'in the process of calcification, there is a primary fatty metamorphosis of tissues and final calcification comes about through a series of intermediate changes in which soaps figure'. Durham (1928) collected the reports of a large number of cases and described one of his own. He has given an excellent review of the literature and seems to think that the colloidal proteins are likely to play a prominent rôle in the formation of calcinosis of the skin, sometimes with associated scleroderma.

Maloney and Bloom (1931) described in great detail a case of calcinosis cutis which they thought to be of metabolic origin. Steinitz (1931), after a detailed study, suggested classification of the different types of calcinosis according to the probable ætiological factor. Epstein and others (1933) suggested that a sclerodermic condition of the skin is probably a precursor of calcification. Tate and Trumper (1933) described a rather unusual case in which the disease was limited to the scrotum. Paterson Ross (1934) described three cases of hypodermolithiasis in which he associated this condition with impaired peripheral circulation.

Quite recently Wilson (1935) has described a typical case of calcinosis circumscripta, which he thinks may be due to endogenous hypervitaminosis D, caused by an unusually high blood cholesterol, superimposed on an old remittent Raynaud's disease.

Types of calcinosis

Maloney and Bloom, in classifying the different types of calcinosis, have divided them into two main groups, local and general. Among the local cases are included those where lime salts are deposited in the tissues, secondary to long-standing inflammatory conditions and in calcification of tumours such as epithelioma, sebaceous atheroma, dermoid cysts or in lesions such as pseudo-xanthoma elasticum. This group the author has described as a purely local disease not dependent on any general disturbance of the body.

The general form of calcinosis has been subdivided into two groups: (1) the metabolic group, and (2) the metastatic group.

(1) *The metabolic type*.—This is supposed to be caused through some imperfectly understood defect of calcium metabolism. The important point about this type of calcinosis is that there is associated bone destruction. The case of a boy, fourteen years of age, described in great detail by Maloney and Bloom belongs to this type of calcinosis.

Epstein and others described a case illustrating the metabolic type of calcinosis in great detail and have come to the conclusion that, in this type of case, the histological changes indicate that the calcification takes place in the collagenous fibres of the corium and in the subcutaneous tissue.

Steinitz who made an extensive review of the literature has further subdivided this metabolic group of cases into the following two distinct types: (a) calcinosis circumscripta, and (b) calcinosis universalis. The former group is characterized by slowly-growing circumscribed deposits of lime salts which commence as small nodules and grow to about the size of a small pea. The overlying epidermis becomes thin and ruptures, the calcareous mass is extruded and healing occurs. The lesions are usually multiple and are commonly situated on the hands, the extensor surface of the elbows and knees, and rarely on the trunk. Apart from mechanical interference with joint movements, the disease does not constitute any serious disability and usually there is no danger to life.

In the other group, i.e., calcinosis universalis, the calcareous deposits occur as large plaques and masses in the skin and subcutaneous tissues and frequently in the connective tissue of the fascia, nerve sheaths and muscles. In some cases, there has been widespread calcification throughout the vascular system. Durham has described a case in which there was a large calcareous mass in the myocardium. When the

calcareous masses disintegrate, there is often severe ulceration with secondary infection and the disease may end fatally.

(2) *The metastatic type*.—In this condition, the blood calcium is markedly high and is almost invariably associated with bone disease such as osteomyelitis, caries or lymphatic leukemia. A detailed description of a case of this type has been given by Weidman and Schaffer. In the case described by them, the calcification of the skin was not limited to the epidermis, but extended widely throughout the corium involving the sweat ducts and glands, pacinian corpuscles and nerve trunks. This the authors regard as an expression of calcareous metastasis because there was definite resorption of the bones in several parts of the skeleton. Morse (1921) also described an interesting case belonging to this group in which the subcutaneous tissue of an infant became calcified.

It will be at once evident that this type differs materially from the metabolic type of calcinosis cutis.

Ætiology

The ætiology of calcinosis is obscure and probably differs in the different types of cases described above. In the metabolic type it has been suggested that it is due to an error of calcium metabolism and is probably analogous to gout, the lesions being of the nature of calcium tophi. In the metastatic group, associated with extensive bone disease, it seems probable that the calcium comes from the bones via the blood stream to the skin, where it is deposited, probably as an attempt at excretion.

The association between calcinosis and scleroderma has been emphasized by several writers. The first attention to this association was probably drawn by Weber and then by Lewen and Heller. Hunter described two cases and collected two others in English literature and eight more from European literature. Durham collected the reports of thirteen such cases and described a case of his own in great detail. Langmead (1923) is definitely of opinion that scleroderma, dermatomyositis, fibrosa and calcinosis are manifestations of the same pathological process, the nature of which is unknown. Epstein and others, making detailed histological studies in a case of calcinosis of metabolic origin, thought that the frequent association of diffuse scleroderma probably indicates a common ætiology and suggests that the sclerodermic process is preparatory to calcification.

Davis (1912) has drawn attention to subcutaneous calcareous concretions in Raynaud's disease. Very recently Paterson Ross has described three cases of hypodermolithiasis in which he associates the condition with the impairment of the peripheral circulation. He suggests that in the early stages the progress of

the disease may be arrested by sympathetic ganglionectomy.

The association of calcification with fat atrophy has been mentioned by Kuznitsky and Melchior (1916). These authors described a case in which there were extensive calcareous deposits in the skin. This was thought to be the result of universal fat atrophy—a typical lipodystrophia progressiva. Morse described a case of extensive calcification of the skin and subcutaneous tissue occurring in areas of fat necrosis in a child 3½ years old. Klotz believes that in such conditions the calcium is first laid down as soap, later changing into less-soluble carbonate or phosphate. It has been mentioned in the literature that there are certain systemic conditions which enhance the local deposition of calcium. Amongst these factors may be mentioned the pH of the blood, the action of sunlight, and the ingestion of vitamin D. The work done by Barr (1930) on this subject deserves special mention here.

What part endocrine disturbance plays in the ætiology of this condition is not known at present, though vague reference to it has been made in the literature. Durham questioned the function of the thyroid and the parathyroid glands. The case described by Maloney and Bloom 'showed signs of endocrine disturbance', though the authors made no further comments on it.

It will be seen from a study of the above review that, although an enormous amount of work has been done and various theories put forward, the real ætiological factor of the disease is still far from being understood. Our contention is that, at least in one of the cases investigated by us, we got some evidence of dysfunction of the pituitary gland and treatment on that basis had the desired effect, and we trust that further work on the same lines may throw more light on the still obscure ætiology of primary calcinosis cutis.

Cases

Case I.—Mrs. L. W., an Anglo-Indian female, aged 27; admitted into hospital on 9th May, 1934.

General appearance.—Marked spinal curvature of kypho-scoliotic type; no noticeable developmental defects; lower extremities somewhat shorter in proportion to the rest of the body; prominent malar bones, large square jaw, features somewhat heavy, skin rough and thick; voice deep.

Cutaneous lesions.—Fairly numerous bony-hard nodules situated in the dermis varying in size from a pea to a small areca nut but distributed symmetrically, mostly in the vicinity of the extensor aspects of the joints, namely the ankles, the knees, the wrists and the elbows. The nodules were raised above the surface of the skin, which, owing to stretching, was pale and yellowish over these nodules. Except for one nodule on the spine and another on the shoulder, the trunk was unaffected. The large nodules were irregular in outline. Several pitted areas were present along the extensor and flexor aspects of the arms and legs. There were no subjective symptoms, except for tenderness or deep pressure. Duration about 10 years.

Each nodule began as a small pimple or papule, slightly raised above the level of the skin and grew

very slowly till, in the course of a couple of years or more, the largest nodules began to soften and ultimately burst through the skin, discharging the gritty cheesy contents. Resolution was very often accompanied with low remittent fever. Healing of these broken-down lesions was uninterrupted.

The patient had symptoms of dysentery off and on for the last ten years, and for the last few years had developed epigastric pain and sickness soon after taking her meals. She had been treated on three previous occasions as a case of sporotrichosis with fairly heavy doses of potassium iodide, with good results.

Physical examination showed nothing abnormal.



Case I

Electrocardiogram.—Slight arrhythmia of sinus origin.

Laboratory examinations. Blood.—No agglutinins against typhoid, para A and para B. Aldehyde and antimony tests—negative (diluted 1/10). Wassermann reaction—negative.

Stool.—Protozoa nil. Scanty trichuris eggs present. *Bact. metadysenteriae* isolated once only.

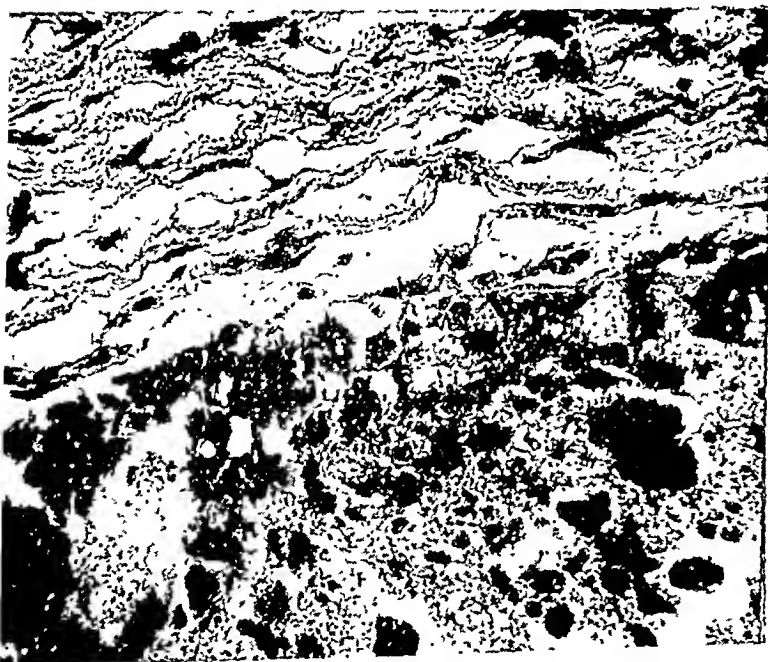
Contents of nodules on chemical examination showed presence of calcium in fairly large amounts. No cholesterol was detected.

The skiagram showed a large number of calcified nodules all over the body, most numerous on the extremities and near the joints; a very large linear deposit was seen on the inner aspect of the left thigh, extending from the knee to about the middle third of the thigh. The heart and lungs were found normal.

The patient was re-examined after six months. Her condition remained unchanged and she had a number of nodules under the skin. She said that as long as she



Section I (case I) (low power).—Entire section of the calcified mass, showing the position of the deposit, which is in the deeper part of the corium just above the superficial fascia. The entire deposit is divided into several small masses of various shapes each being surrounded by a capsule and gives a loculated appearance.



Section II (case I) (high power).—Shows deposit of calcium with a fibrous capsule. A few giant cells are seen at the periphery of the deposit.

used sodium phosphate no fresh nodules appeared, but when she stopped the drug, fresh deposits occurred. Otherwise she felt fairly fit.

Case II.—A. M., a Hindu female, aged 8 years, admitted to hospital on 14th November, 1934.

General appearance.—The stature of the child was out of the ordinary, head unusually large and face of the masculine type; arms and legs abnormally long; prominent malar bones; large square lower jaw; tongue rather large; features heavy; teeth widely separated from one another.

The previous history of the child is interesting. For some years past, she had been increasing in weight and in stature disproportionately to her age and the condition was then diagnosed as a pseudo-hypertrophic muscular paralysis; the child was unable to climb stairs owing to weakness in the muscles; treatment was of little avail.

Cutaneous lesions.—These began three to four years ago. Small hard nodules under the skin varying in size from that of a pin head to a pea. Distribution more or less even, mostly in the vicinity of the extensor surfaces and near joints, mainly knees, wrists, and elbows. The skin over the nodules was movable. A hard cord-like swelling in which a few separate very hard nodules could be felt were present in the thigh and the leg, both on the extensor surfaces. Some of these tumours burst spontaneously and a whitish creamy material came out leaving an ulcer, which took a long time to heal. On chemical examination, this material proved to be composed mainly of calcium carbonate and partly of calcium phosphate. No cholesterol or fatty acids could be detected. Culture showed streptococci and staphylococci.

Blood chemistry.—A glucose tolerance test showed a definite marked increase in the tolerance. Blood cholesterol normal. Blood N-P N., urea, uric acid, sugar, all were within normal limits. Blood calcium was 14 mgm. per 100 c.cm. on admission.

Histological findings.—In the epidermis, the nuclei of the prickle cells look vacuolated with nuclear material represented as a thin demilune towards the periphery. Here and there almost all the cells of the prickle cell layer are of cylindroid appearance and show melanin pigment. The horny layer is normal. In the corium there is papillary and sub-papillary œdema without any evidence of infiltration. There is a slight perivascular and perilymphatic infiltration; but no evidence of inflammatory changes in other parts of the corium. The sebaceous and sweat glands are partly atrophied. Lime salts are seen deposited deep down in the corium. The blood vessels in the deeper portion of the corium show endarteritis obliterans and a condition of thrombo-angiitis. The deepest portion of corium shows a fair number of newly-formed arterioles with walls consisting of a single layer of endothelial cells and all showing thrombo-angiitis. This portion of the corium shows a distinct area of patchy extravasation.

The deposit itself appears to be distributed in small loculi in the connective tissue elements the walls of which are formed by proliferation of connective tissue cells and fibroblasts. A large number of swollen and disintegrating connective tissue cells can be seen in the calcifying debris.

Treatment

It is to be expected that in a disease where so much diversity of opinion exists regarding the aetiological factor, the suggestions regarding treatment would naturally be diverse. That this is so can readily be seen from a study of the literature. As a matter of fact some authors, who have described the other aspects of the disease in great detail, preferred to remain silent regarding any suggestions as to the line of treatment to follow. The treatment of calcinosis cutis therefore continues to be unsatisfactory.

Among the lines of treatment suggested may be mentioned that of Craig and Lyall (1931) who advocated the administration of di-sodium phosphate in doses of 2 grammes three times a day. Kennedy (1932) obtained marked improvement in his patients by the use of a ketogenic diet. Bauer (1931) advocated the

the skin. The results of this mode of treatment have also been uncertain and unconvincing.

Reference to some of the other methods of treatment advocated has already been made under the heading of aetiology.

In both the cases described by us, we administered fairly large doses of sodium phosphate extending over long periods particularly in case I. No noticeable change was observed, though it was found that while the patient was on sodium phosphate no fresh nodules appeared. Parathyroid gr. 1/10 three times a day was tried in case I, with uncertain results. Case II had parathyroid treatment before she came to us, and the result as described to us was that 'the nodules continued to increase in number and size, and the treatment had to be stopped'.

Gradually increasing doses of anterior pituitary extract (with small doses of thyroid, to enhance its action) were tried in this case and within a short time noticeable changes were observed in the nodules; they began to get softer and smaller, and by the time the patient left hospital her condition was much improved. She has been continuing the treatment with very good results.

Discussion

It will be seen from what has been said above that the two cases described by us belong to the group of the metabolic type of calcinosis cutis (calcinosis circumscripta of Steinitz). In addition to the typical clinical picture we have given, these cases appear to present a few unusual features, which we hope will be of special interest to other workers when investigating cases of this type.

Both the cases, and more particularly case II, appeared to present definite physical signs of previous hyperpituitarism. The masculine type of face, enlarged head and long bones, prominent malar bones, a large thick lower jaw, large tongue, coarse thick skin and heavy features, all point to a condition of hyperaction of the anterior lobe of the pituitary, though at the time the patient came under our observation she had drifted towards a condition of hypopituitarism, as is usual: Blair Bell (1919) has stated that patients suffering from acromegaly live for some years in a condition of hyper-hypophyism, but finally drift into a condition of hypo-hypophyism. Cushing holds the same view and states that hypopituitarism very often succeeds hyperpituitarism and it is not uncommon to find at this later stage a cystic or necrotic change in the anterior lobe of the pituitary. Our opinion is that both the cases, specially case II, presented signs and symptoms of hypopituitarism at the time of investigation. The high sugar tolerance in case II is additional evidence in support of this.

There is evidence in the literature that the pars anterior of the pituitary gland exerts a great influence on calcium metabolism and in conditions where the function of this gland is



Case II

use of a diet low in calcium combined with a decalcifying agent, such as ammonium chloride.

The treatment of the condition with parathyroid gland has been tried by some of the workers, though there are others who are against the idea of administering extracts of parathyroid in this condition. Durham, however, believed that in this condition the parathyroid glands are normal in histological appearance. Hueper (1927) believes that parathyroid hormone helps calcification and that experimental calcification can be produced in animals by injecting parathyroid hormone.

The administration of thyroid in this condition has also been advocated, the idea being that thyroid dysfunction is probably the factor in the accompanying sclerodermic condition of

suddenly lowered, as in the later stages of acromegaly there is a tendency towards calcium retention in the system. Franchini (1907 and 1908) made detailed investigations in several such cases and came to the same conclusion.

It will thus be seen that the anterior pituitary plays some part in the proper utilization of calcium in the system. Klotz (1912) has definitely stated that the administration of the extract of anterior pituitary caused an increased utilization of calcium in the tissues.

We must admit that the therapeutic use of the extract of the anterior lobe of the pituitary made by us with apparent success, in case II, was started with an empirical, if not a speculative idea, as the data we obtained from the clinical signs and symptoms and the laboratory examinations were not complete. Nevertheless, we would emphasize that the line we have indicated is well worth following and we feel that further investigation on similar lines, in similar cases, would throw more light on the hitherto obscure problem of calcinosis cutis.

Summary and conclusions

(1) Two typical cases of the metabolic type of calcinosis cutis (calcinosis circumscripta) have been studied and described. The histological changes indicate that calcification took place in the collagenous fibres of the corium and in the subcutaneous tissues.

(2) A possible lowered function of the *pars anterior* of the pituitary gland as one of the ætiological factors is suggested and treatment of this condition by extract of the anterior pituitary lobe is recommended.

(3) It is suggested that investigation on the lines recommended may throw more light on the ætiology of the disease.

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EVIPAN-SODIUM

(INTRAVENOUS ANÆSTHETIC)

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EVIPAN-SODIUM is issued in dry ampoules of 1 gramme.

With each powder is also supplied an ampoule containing 10.5 c.cm. of distilled water.

Chemistry.—It is the sodium salt of N-methyl-cyclo-hexenyl-methyl barbituric acid, which dissolves freely in water.

Pharmacology.—It is not a volatile narcotic and as such it is uncontrollable. It is rapidly detoxicated. Detoxication depends on chemical decomposition—oxidation—chiefly in the liver. Traces of unchanged substance are excreted in the urine. The blood pressure drops, both systolic and diastolic, and quickly returns to normal. The pulse rate increases and becomes rapidly normal again, it remains regular and full. Death is always due to cessation of respiration. Metabolism, temperature, blood-urea, blood-sugar, urine, remain unaltered, providing that it has not got any injurious effect on any organ.

Disappearance of corneal reflex and absence of other reflexes represent full anæsthesia.

Pre-operative measures.—Preliminary preparation of the patient for the anæsthetic is not necessary. He need not remain without food on the day of the operation. Pre-operative administration of morphine, scopolamine, or omnopon is unnecessary and I do not use them, so as to avoid cumulative action on the respiratory centre. With preliminary medication I have seen prolonged unconsciousness and found difficulty in ascertaining the proper dosage in

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patients who are very drowsy. It would not be out of place to mention here that patients need not be aware of the anæsthetic which is to be used and which they often apprehend more than the operation.

Preparation of the solution.—Draw 10 c.cm. of distilled water in a 10 c.cm. record syringe. Break the neck of the ampoule containing the dry white evipan-sodium powder. Inject the water into the ampoule and dissolve the powder by shaking and repeated aspiration into the syringe. The solution must be freshly prepared.

Contra-indications.—Evipan-sodium should not be used :—

For long operations.

In seriously ill, old and cachectic patients.

In circulatory and respiratory disturbances.

In cases of jaundice and extensive damage to the liver parenchyma.

In eclampsia, diseases of the central nervous system, and general disturbance of metabolism.

Dosage and technique of injection.—The arm is prepared as for an intravenous injection and having everything ready for the operation, the solution is injected into the median basilic vein with ordinary aseptic precautions. The injection must be given very slowly at an average rate of 1 c.cm. in 10 to 15 seconds. The dosage is regulated during the injection by exact observation of the patient and it is here that experience is necessary. The patient is asked to count and it is noted the moment the patient stops counting and falls asleep. If the patient is young and strong, half as much again is injected, i.e., if he stops counting after 4 c.cm. have been injected (induction dose) then a further 2 c.cm. (additional dose) would be required for a short operation. I have found it quite safe to inject a little more than this to ensure complete anæsthesia in healthy average individuals. That is, 4 c.cm. (induction dose) + 2 c.cm. (additional dose) + 1 c.cm. = 7 c.cm. (total dose).

Remarks.—In most cases the patients fall asleep with a long drawn yawn, slight muscular tremors occur, jaw and tongue become relaxed, for a moment there is definite diminution of respiration. This should be carefully watched and much stress must be laid on this. Great care must be taken and a constant watch for a free air-way should be continuously maintained. Respiration soon becomes regular in rhythm. The colour remains fresh and pink.

The operation may be commenced immediately the injection has been given. It is preferable to wait for a minute or two to ensure the anæsthesia becoming deep enough. If too small a dose is given or in some very resistant patients with an average dose, a temporary stage of excitement is observed. This is very unpleasant to the operator and a large amount of general anæsthetic is required to bring such patients properly under. The duration of anæsthesia is on an average 15 to 20 minutes. If it is decided

that the operation will last for more than 20 minutes the addition of inhalation anæsthesia (mostly ether) must be resorted to. This must be started early, before the patient is coming out of evipan-sodium and the transition must be gradual and unnoticed, and if done in this way will require very little anæsthetic. Otherwise the same difficulty will arise, the patient becomes boisterous and requires a large amount of anæsthetic, as in the case of insufficient dosage. No hard-and-fast rule can be laid down for the regulation of the dose of evipan-sodium and the dose varies with individuals. Great care and exact observation is necessary to regulate the proper dose of every patient. It is not necessary to take body weight into consideration as the dose is determined by age, and constitutional behaviour during the injection. Females require a little less than males.

A condition of excitement before the operation is almost always due to under-dosage. During the injection fine tremors run over the whole body and also the occurrence of a tonic rigidity of the skeletal muscles and holding of breath has been observed. It has also been noticed where the dose has been insufficient that the patient though unconscious becomes resistant. Some patients awake within half an hour to an hour and become very boisterous and shout so much that morphia is needed to keep them quiet. Others sleep quietly for a longer period and awake fully refreshed.

No post-operative vomiting has ever been observed.

The chief indication for evipan-sodium is for small operations of short duration but it has been used by me with additional doses in major operations like hernia without any ill effects. In a case of appendicectomy which lasted nearly an hour, a second intravenous injection of 7 c.cm., twenty-five minutes after the first 10 c.cm. (total 17 c.cm.), was given by me with complete and satisfactory anæsthesia. It has also been given by me repeatedly on the same patient.

No incident threatening life nor any serious disturbance occurred in my series. Excepting the fact that the respiration becomes shallow at the beginning of injection, there has been no cause of anxiety in my series of cases during the operation or after the patient was taken to the wards.

The drug should never be used single-handed, as a constant watch for a free air-way should be continuously maintained, so it should always be administered by an anæsthetist who will be able to maintain the free air-way and will always be ready to give a general anæsthetic if necessary. Respiratory failure and circulatory collapse have not been seen in my series of cases and in my opinion these can be prevented by a proper selection, careful watch, correct dose and faultless technique. The drug

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A NOTE ON THE RELATIVE VITAMIN C-VALUES OF MILK AND CURD

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and

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In this country curd is very extensively consumed especially by the adult population and is very frequently preferred to milk. Accordingly it was considered of interest to investigate how the ascorbic acid content of milk was affected by the process of the conversion of milk into curd. It was conceivable that the warmth needed for curdling would adversely affect the stability of the vitamin in milk. On the other hand, the lowering of pH owing to the formation of acid might stabilize the vitamin. There was also the third possibility that the lactic acid bacillus might be able to synthesize the vitamin, in which case there should be an increase in ascorbic acid content. We have, therefore, investigated the same sample of cow's milk before and after conversion into curd and we have obtained evidence to show that the formation of curd stabilizes the vitamin in milk completely, which would, otherwise, be lost to a certain extent even by storage at 0°C. There occurs, however, no increase in the vitamin C content during the curdling process.

Experimental

The method of estimating ascorbic acid by titration against 2:6—dichlorophenol indophenol, as modified by us (Ghosh and Guha, 1935; Guha and Ghosh, 1934), was employed.

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should only be used by an expert anaesthetist who is able to attend to emergencies and apply restoratives should matters ever become serious. Artificial respiration should be employed, oxygen should always be kept readily available together with coramine and lobeleine.

Patients who had experience of previous inhalation anaesthetics expressed satisfaction with evipan-sodium narcosis. If intravenous methods are preferred it is an excellent anaesthetic for short operations, its action is so rapid and pleasant; it is extremely useful in minor surgery especially where slight reflex movement is not a matter of any great concern.

In my series of 78 cases it was used with success in the following operations:—

Whitlows, opening of abscesses, amputation of fingers, operations on the mammae, hydrocele, setting of fractures, reduction of dislocations, ankylosis, tonsillectomy, enucleation of the eye, linear extraction of cataract, carbuncles, inguinal hernia and appendicectomy.

A NOTE ON THE VITAMIN B₁, B₂- AND C-VALUES OF COUNTRY LIQUOR PREPARED FROM THE DATE

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In countries inhabited by rice-eating people and affected by beri-beri, the consumption of crude liquors prepared from some indigenous trees have often been stated to be of considerable nutritional significance. The diet in such countries is to a large extent one-sided and relatively rich in carbohydrate. The provision of vitamin B₁ in the national dietaries in these countries becomes of considerable importance and the

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Curdling of the milk was effected by seeding with a very small amount of curd and incubating at 35°C. for 24 hours.

The following results were obtained:—

TABLE I

	Ascorbic acid (mg.) per c.cm.
Cow's milk (fresh at room temperature)	0.007
Curd formed from the same sample of milk during 24 hours at 35°C.	0.007

In table II are given the comparative values of the ascorbic acid of a sample of milk after different intervals of storage at 0°C. and also after curd formation at 35°C.

TABLE II

	Ascorbic acid (mg.) per c.cm.
Cow's milk (fresh)	0.010
" (after 3 hours at 0°C.)	0.009
" (after 6 hours at 0°C.)	0.008
" (after 24 hours at 0°C.)	0.007
Curd from the same milk (obtained after 24 hours at 35°C.)	0.010

Summary

(1) There is a gradual but slow loss of ascorbic acid in cow's milk stored at 0°C.

(2) The formation of curd stabilizes the ascorbic acid of cow's milk completely even if the curdling is carried out for 24 hours at 35°C. The curd retains the entire amount of the ascorbic acid of fresh milk.

(3) As there is no increase in the ascorbic acid content during the curdling process, the lactic acid bacillus apparently cannot affect the synthesis of this vitamin under the stated conditions.

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country liquors have been stated to supply this need to some degree. It has been reported, for instance, in *Nature* (1934, 2nd March, p. 322) editorially that, 'a short time ago, the island of Nauru in the Pacific suffered from a most alarming outbreak of beri-beri, especially infantile beri-beri: the officials in charge of the island had first of all encouraged the consumption of milled cereals, and then forbidden the consumption of the intoxicating national drink—"toddy"—made from the fermented swathe of the coco-nut. Thus the diet was deficient in vitamin B₁. It is dangerous for authority, with inadequate knowledge of problems of nutrition, to control food policy'.

Country liquor, prepared by the fermentation of a juice obtained by incision into the trunk of the date tree, is extensively consumed in this part of the country, especially during the cold weather. We have investigated the vitamin B₁-, B₂- and C-values of different samples of this liquor and we have found that they are poor in vitamin B₁ but that they contain a certain amount of vitamin B₂. The ascorbic acid value of the liquor, however, is fairly high, being about 10 times that of an average sample of cow's milk in Calcutta (Ghosh and Guha, 1935)^b.

In order to find if fermentation would affect the vitamin content of the liquor, the fresh juice obtained from the date tree was also examined. Although strict comparison is not warranted, as the determinations were not made with the same material, fermented and unfermented, the average values would indicate that the fresh juice contains the same amount of ascorbic acid as the liquor but that it is poorer in vitamin B₂. This might indicate that some vitamin B₂ is produced in the fermentation process, but this observation requires further confirmation. The fresh juice is practically as deficient in vitamin B₁ as the liquor.

Method.—The biological method of assay with young rats was adopted for the estimation of vitamins B₁ and B₂ (Guha and Chakravorty, 1933a) and the titrimetric method was employed for the determination of ascorbic acid (Guha and Ghosh, 1934; Ghosh and Guha, 1935)^a.

Both the liquor and the fresh juice were concentrated under reduced pressure for feeding experiments. The fresh juice and liquor were used as such for ascorbic acid determination. The ascorbic acid content of the liquor was also determined at intervals in order to see whether it deteriorates.

The pH of the fresh juice was usually 4.6 and of the liquor 4. The alcohol content of the liquor varied between 2.6 and 5.4 per cent by volume.

Results.—The fresh juice contained on an average 7 units of vitamin B₂ per 100 c.cm. (as defined by Guha and Chakravorty, 1933b), while the liquor contained 14 units per 100 c.cm.

(Continued at foot of next column)

A REPORT ON PLAGUE IN PEERMADE (TRAVANCORE STATE)

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Historical introduction

PLAGUE started in Bombay in 1896 and spread rapidly throughout India. It appeared in the Madras Presidency in 1898 and according to Russell (1930) the districts adjacent to Travancore State were soon infected: Coimbatore in 1899, Nilgiris in 1903, Malabar in 1906 and Madura in 1910. The Cumbum valley in Madura which adjoins the Peermade taluk of Travancore was first infected in June 1920 and has remained continuously infected since that date. It is probable that plague entered Travancore by way of neighbouring infected districts in Madras Presidency.

The earliest reference to plague in Travancore is the Government Order issued in 1904 declaring Aramboly, Shencottah and Munambom as plague observation stations. These three are frontier stations guarding the entrance from Tinnevely district and Cochin. The frontier station at Kumili in Peermade taluk was not included in that notification as Madura and Cumbum valley were not infected at that time

(Continued from previous column)

Both the juice and the liquor failed to support growth or even maintenance of weight even in daily doses of 15 c.cm. (previously concentrated *in vacuo*), when supplied as the source of vitamin B₁.

Both the juice and the liquor contained 0.1 mg. ascorbic acid per c.cm. The ascorbic acid content of the liquor on standing at room temperature (27°C.) for 7 hours and for 3 days fell to 0.08 mg. and 0.05 mg. respectively.

Summary

Vitamin B₁-, B₂- and C-values of the country liquor made from the date have been estimated. It is relatively deficient in vitamin B₁, but contains considerable amounts of vitamin B₂. It is about 10 times richer in vitamin C than an average sample of cow's milk in Calcutta.

The vitamin values of the fresh unfermented juice are also of the same order. The fresh juice appears to be somewhat poorer in vitamin B₂ than the liquor.

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and the importation of plague through Kumili was not then considered as probable.

In 1910 an imported case of plague from Palghat was reported in Meenachil taluk; in 1920 one death from an imported case of plague was recorded at Chothippara estate in Peermade, the infection being imported from Cumbum valley. There were four attacks and three deaths from plague, all imported cases from Cumbum valley in 1921 in Devicolum taluk. There was one death of an imported plague case from Tuticorin reported from Agasteeswaram taluk in 1924.

The first indigenous cases of plague in Travancore were reported from Devicolum taluk in 1927 and during 1928. There were 13 attacks and 5 deaths in this outbreak. A special plague officer and staff were appointed for the control of this outbreak and mass inoculation, disinfection of goods and coolie lines and rat destruction were undertaken. The administrative control of plague operations was vested in the Commissioner, Devicolum.

In Peermade taluk, the earliest record of indigenous plague was in December 1930 when two deaths from suspected plague were reported. These were not confirmed by microscopical examination. Numerous dead rats were reported from Chittappanpara estate in February 1931; two deaths from plague both indigenous cases, in which diagnosis was confirmed by the bacteriologist, were reported from Kumili early in April 1931 and on 11th April, 1931, Government passed orders declaring Kumili as a plague-infected area.

In April 1932, plague broke out at Bonami estate, Peermade, in a severe form and the infection continued there till the end of May. Cases of human plague were also reported from Cheenthalar and Ladrum estates, in Peermade taluk in July the same year. The plague outbreaks at Bonami, Cheenthalar and Ladrum are considered in more detail in a subsequent section.

General description of Peermade hills

The Peermade taluk forms part of the high-land division of the Travancore State. On the east it touches the Madura and Ramnad districts of the Madras Presidency. The following description of the area is extracted from the *Travancore State Manual*: 'The Peermade hills form an extensive plateau with peaks rising up to 5,000 feet. The land slopes from the High Ranges in Devicolum southwards to the Cardamom hills and Peermade. From the main range and from the western watershed of the Peermade plateau rocky spurs run out to the west and north-west extending at times to within a short distance of the sea forming a series of parallel valleys drained by numerous rivers. The Peermade taluk is divided into five pakuthies or smaller revenue subdivisions, viz, Millappara, Peermade, Peruvanthanam, Periyar

and Vandanmettu. Of these Periyar and Millappara consist of reserve forests which go to make up the catchment area of the Periyar lake. Peruvanthanam pakuthy on the western slope contains most of the rubber estates and Vandanmettu pakuthy on the eastern slope contains most of the Cardamom lands. The chief tea estates are distributed over the central area in Peermade, Periyar and Vandanmettu pakuthies'.

The main highway from Kottayam to Madura district traverses the Peermade taluk from the 33rd to the 70th mile. Numerous roads branch off from this road to the various tea estates, but the Cardamom lands are not accessible by these roads. A plague observation and disinfection station is located at Kumili, at the 70th mile on the main road at the entrance from the Cumbum valley of the Madura district. Numerous bridle paths lead down from the Peermade taluk to the Cumbum valley and at the three most important bridle paths, viz, Chellarcoil, Cumbumettu and Rammakkal, plague observation stations are located, in order to prevent importation of infection from the infected villages in Cumbum valley.

TABLE I

Attacks and deaths from plague in Cumbum valley from the year 1920 A.D.

Year	Attacks	Deaths
1920	Not available	4,098
1921	Do.	544
1922	Do.	241
1923	7,109	3,652
1924	734	385
1925	135	58
1926	436	209
1927	2,561	929
1928	1,053	481
1929	961	419
1930	1,435	711
1931	1,565	813
1932	2,326	934
1933	2,167	663
1934 up to end of March 1934.	310	168

From the foregoing table it is seen that Cumbum valley has remained an endemic centre of plague for the last fourteen years.

TABLE II

Monthly rainfall in inches for 1931 and 1932
in Peermade taluk

Months	RAINFALL IN INCHES		Average rainfall for the last 58 years
	1931	1932	
January ..	0.00	0.00	0.60
February ..	0.00	6.57	1.10
March ..	5.31	1.31	2.50
April ..	5.67	3.20	5.70
May ..	4.04	34.67	11.50
June ..	26.74	16.09	47.30
July ..	27.12	68.68	50.90
August ..	60.03	18.27	35.30
September ..	62.01	22.93	19.50
October ..	14.54	20.25	19.70
November ..	11.60	8.22	8.80
December ..	11.93	0.53	2.10
WHOLE YEAR ..	229.02	200.72	205.30

Population and area

Peermade taluk has an area of 450 square miles and a population of 46,023 (1931 census) against a population of 24,026 according to the census of 1921. This enormous increase in population is due to immigration from the neighbouring districts consequent on the rapid development of the tea and rubber estates during the years after the census of 1921. More than half of this immigrant population come from the districts of Madura, Coimbatore, Malabar, Trichinopoly and Tinnevely all of which include important and well-recognized plague-infected areas.

rainy days being 157. The highest monthly rainfall averaging about 50 inches occurs in June and July during the south-west monsoon. In the north-east monsoon, during the months of October and November, the monthly rainfall averages between 10 and 20 inches. In the dry months from January to March the average monthly rainfall is only 2.5 inches.

The relative humidity varies from 85 per cent to 100 per cent in the periods from June to August, while from January to March it is around 75 per cent. The monthly maximum temperatures vary from 70°F. to 80°F. while the mean monthly minimum temperatures vary from 53°F. to 65°F. The monthly maximum and minimum temperatures as well as relative humidity for the Bonami estate (where the plague outbreak occurred in 1932) for the years 1931 and 1932 are shown in table III. The observations with regard to the meteorological conditions in Peermade show that the climate there is favourable for the multiplication of the rat-flea *X. cheopis* which is the reputed transmitter of plague. Hirst (1927) says that a mean temperature of 75°F. with a fair amount of moisture in the atmosphere favours *cheopis* breeding and this leads to an increased *cheopis* index and to rat and human plague. Above 80°F. *cheopis* breeding is checked. It is also stated that plague does not maintain itself in epidemic form when the mean temperature is above 80°F. or when it falls below 68°F. In Bonami estate in Peermade where an outbreak of plague occurred in 1932 the monthly mean temperature was between 74.65°F. and 62.25°F.

TABLE III

Temperature and relative humidity observed at Bonami during 1931 and 1932

Month	MAXIMUM TEMPERATURE, °F.		MINIMUM TEMPERATURE, °F.		MEAN TEMPERATURE, °F.		RELATIVE HUMIDITY	
	1931	1932	1931	1932	1931	1932	1931	1932
January ..	74.8	72.1	59.3	53.4	67.0	62.8	80.0	74.9
February ..	80.3	78.8	59.9	57.1	70.0	67.9	75.4	77.5
March ..	83.9	80.8	63.4	60.5	73.6	70.7	69.9	68.4
April ..	83.7	81.9	65.4	63.5	74.6	72.7	82.4	82.8
May ..	83.3	78.4	66.0	62.2	74.7	70.3	84.3	84.2
June ..	74.7	73.8	64.5	62.4	69.6	68.0	97.4	94.5
July ..	73.2	70.8	65.0	60.7	69.0	65.8	97.7	95.0
August ..	69.2	75.0	64.4	61.6	66.8	68.3	98.1	89.5
September ..	75.1	72.2	61.9	60.9	68.5	66.5	89.5	93.6
October ..	77.4	74.2	62.0	62.3	69.7	68.3	85.6	91.5
November ..	73.6	70.2	61.9	61.8	67.8	66.0	85.1	89.5
December ..	73.4	70.0	61.1	59.0	67.3	64.5	89.4	79.5

Climate

Peermade has a cool moist climate. The average annual rainfall recorded at the Peermade Residency for the last 58 years is 205.30 inches which is the highest record for any station in Travancore; the average number of

In view of this information the temperature conditions in Peermade taluk from February to May can be considered as favourable for the existence of plague in epidemic form, while during the other months it is not sufficiently low to prevent outbreaks.

Rats and rat fleas

In Peermade the opportunities are numerous for close association between rats and man. The houses are crowded together, dark and ill-ventilated. The holes in the floor and the ceiling offer excellent shelter for rats. The coolie lines are insanitary and overcrowded and the tea bushes around the lines also offer good shelter for the rats.

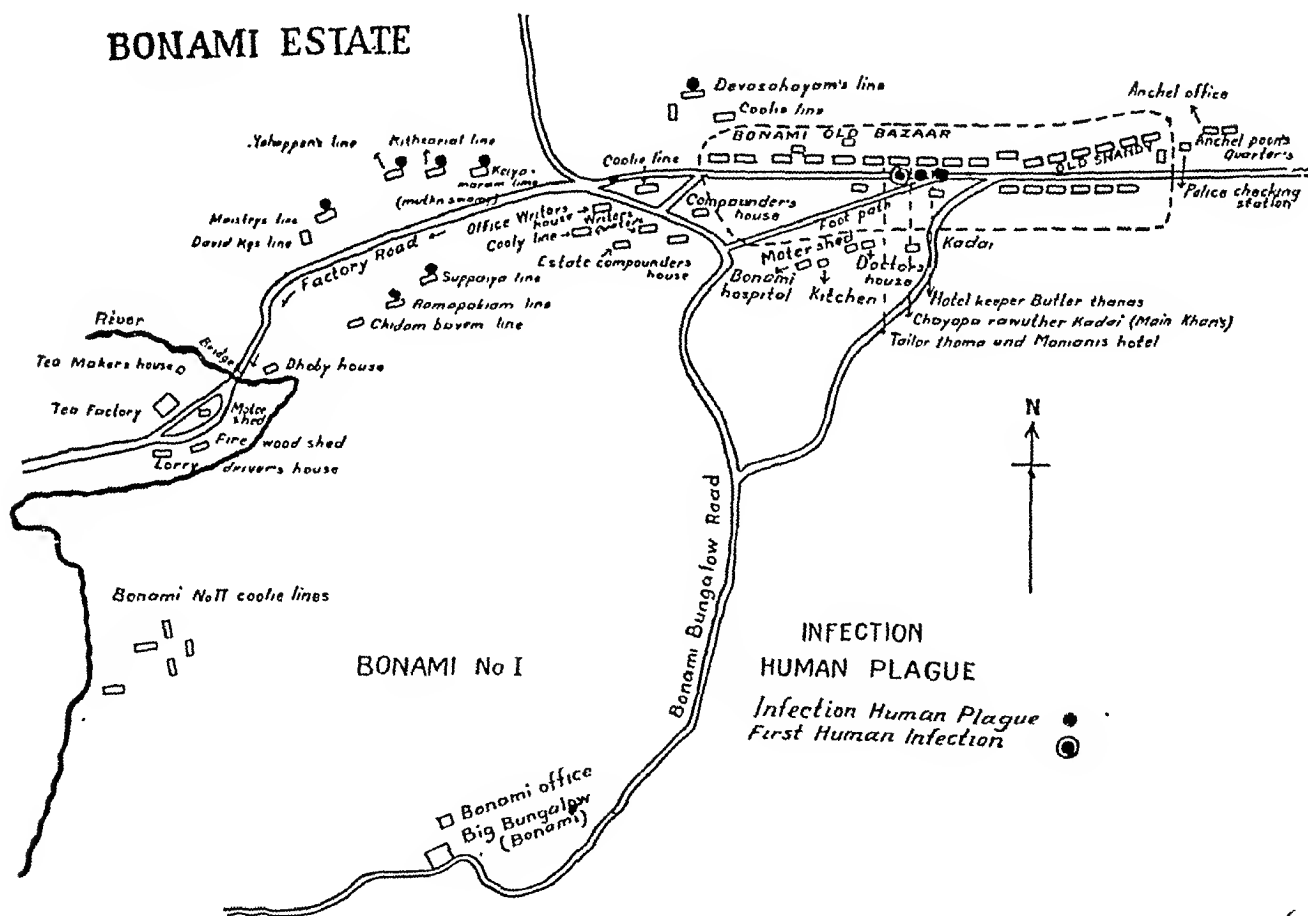
Every estate has one or more rice stores all teeming with rats. In one small rice store, more than two hundred rat holes were discovered. The markets also form important centres of rat population, the chief markets in the taluk being located at Bonami, Pambanar and Vandiperiyar. Rats also abound in the bushes along the main road from Peermade to

number of fleas collected as a result of the survey conducted by the entomological staff was 6,226. The results of identification of these fleas are given in the following table.

TABLE IV
Percentage and classification of fleas in Peermade

Fleas genera	Percentage
<i>X. cheopis</i>	50.2
<i>X. astia</i>	27.2
<i>X. brasiliensis</i>	0.9
<i>Stivalius</i>	9.3
<i>Ctenocephalus</i>	1.4
<i>Echidnophaga</i>	8.9
<i>Leptopsylla</i>	0.0
<i>Ceratophyllus</i>	0.1
<i>Pulex</i>	2.1

MAP I



Cumbum valley; particularly around the usual halting places of the bullock carts where a lot of grain escapes from the bags. These halting places are usually in the vicinity of a group of houses and these become potential centres of plague infection.

A rat-flea survey of Peermade was carried out by Iyengar (1934), Entomologist of the Public Health Department, from September 1932 to March 1933. Two thousand four hundred and seventy-two rats were caught of which 2,463 were *Rattus rattus*, 5 were bandicoots, 3 *Mus* and 1 *Pachyura*. The total

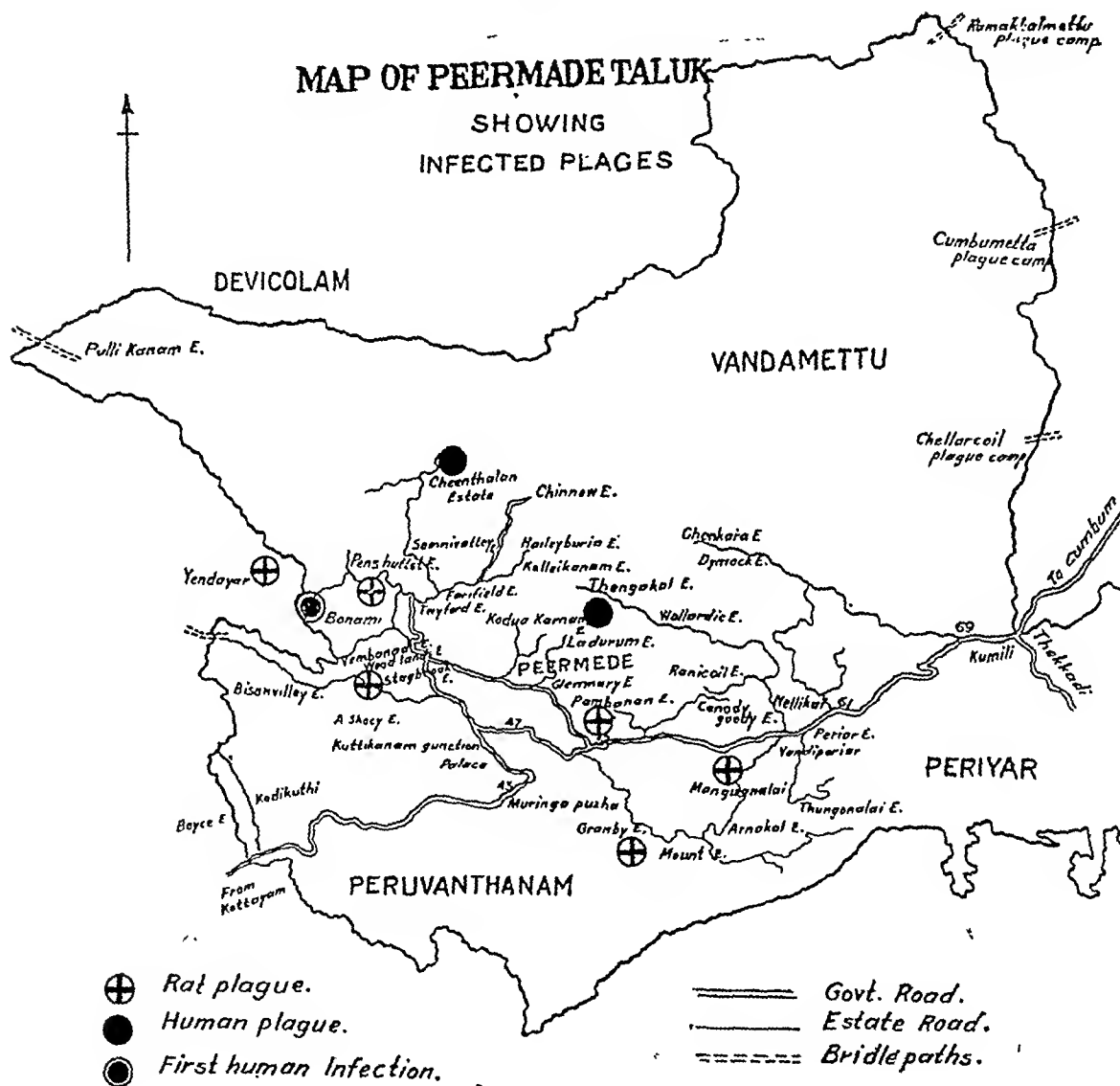
The conclusions of the medical entomologist on the survey are as follows: 'In the high-lying area of Peermade the prevalence of the principal plague transmitting flea *X. cheopis* is extensive. It is as high as 72 per cent in *Rattus rattus* caught in this area. This figure is far higher than is necessary for effective plague transmission as observed in other localities in India. It is difficult to decide whether *X. cheopis* is indigenous or has been introduced from infected areas to the east of the ghats. In the lower region of Peermade *X. cheopis* disappears and *X. astia* is very prevalent'.

Plague outbreak in Bonami in 1932

The plague outbreak in Bonami in March and April 1932 may be considered as the first serious outbreak in the State and the first one that was not immediately brought under satisfactory control. The fact is now recognized that this was due to the late recognition of and notification of the early cases.

The day after the beginning of this illness of Maria her husband Thomas was reported to be sick, but he was brought to my notice only on 2nd April and he also was found to have congestion of lungs. He died on the 3rd April. Another case was one Janamma in the same line who fell ill on the 1st April and was suffering from pneumonia. By the 10th April,

MAP II



With regard to these early cases, the following extract from a report by the medical officer of Bonami estate may be of interest. He states 'that one Maria, wife of tailor Thomas fell ill on 27th March; she had fever for about four days when I was called in. She showed on examination symptoms of pneumonia. She had also mastitis. A boy by name Palaya in the neighbourhood had also an attack of fever on 25th March. He had fever, diarrhoea and rash on the chest and was considered to be a case of enteric. He died on the 29th March.

she developed a swelling below the ear and died of high fever on 14th April. Two more deaths in the same line caused panic and the occupants were advised to shift to the neighbouring lines. The death of one Idichandy, a tailor living in the same line, of plague, at Mavelikkara on the 10th April, revealed for the first time the infection of plague in this locality'.

The first recognized case of plague referred to above was the tailor Idichandy who was working for many years as a tailor in Bonami

consulted me. Forty-two days had passed since the complaint started, even then the consistence of the penis was harder than that of cartilage. There was no trouble with regard to micturition, but he complained of local pain. The dorsal vein of the penis was prominent. I was at first tempted to make multiple incisions as recommended by Romanis and Mitchiner, but later thought of trying the effect of leeches once again. Six leeches of moderate size were distributed one on either side of the body of the penis near the glans, two on the dorsum and the remaining two at the root of the penis. The effect was quite marked, as the leeches sucked in blood the penis became gradually smaller and softer. There was slight oozing for a day, but the bite marks healed up afterwards. So far, there has been no recurrence of the trouble.

Interesting points about the case.

1. Absence of any abnormality even after x-ray examination.
2. No history of sexual excesses or unnatural offences.
3. Persistence of the condition for a period of six weeks without relief.
4. Maximum doses of potassium bromide had no effect on the condition.

Thus two important causes of priapism, viz, sexual excesses and malpractices and the presence of spinal tumours appear to be eliminated in this case. The condition was evidently due to local congestion and two leeches were not enough to relieve it.

SUSPENDED ANIMATION

By A. F. W. DA COSTA, F.R.C.S.E., D.T.M.,
L.M.S., V.D.

Civil Surgeon, Buldana

CASES are on record where it is alleged that persons who have been taken as dead have recovered when about to be buried; also bodies of others which have been exhumed a few days after burial have been found to be in a state of contortion, clearly testifying to a struggle for breath or life. We also hear of persons being in a state of trance, in which breathing or heart beats are scarcely or not perceptible.

The usual signs of death are: stoppage of breathing, cessation of heart beat, lowering of the body temperature, loss of the corneal and pupillary sensibility, and so on.

I recently saw an Indian who could expand his chest thirteen inches, and had perfect control over his heart and blood vessels. He could completely stop his radial, carotid or temporal pulses either singly or simultaneously on both sides for several seconds at a time; he could also stop his heart beats for several seconds and I could not discover with the aid of a phonendoscope even the suspicion of a heart sound, thus showing perfect control over his circulatory system.

There is on record the case of Colonel Townshend who used to say that he could die and come to life again, as he wished. He used to lie flat on his back and his radial pulse

gradually sank till it was imperceptible, his heart became still and his breath used to stop until it did not dim the shining mirror held to his mouth. After a period of several minutes he used to breathe gently and slowly restore himself to animation again.

In the East one comes across Sadhus living chiefly in the jungles and in the mountains, who practise 'Yoga' and who appear to have perfect control over the various systems.

A CASE OF ECLAMPSIA

TREATED WITH 'CHLORAL HYDRAS'

By L. R. LAKHKAR

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(E. S. A.)

On the morning of 3rd April, 1935, I was called in to see a case of delayed labour accompanied by fits. The patient was a young girl, 18 years old and of a good constitution.

Previous history.—Patient's mother died of a similar trouble during delivery. The patient had one abortion two years back.

Present history.—The patient noticed swelling of both feet and legs 15 days previously. On the afternoon of the 2nd April she had pain in the abdomen. It was intermittent and thought to be labour pain. The pain continued for some hours and then disappeared. At 1 p.m. in the night she suddenly vomited and rolled her eyes upwards, her whole body became rigid and began to shake. This continued for 15 minutes. She had three similar attacks before morning. On examination at 7 a.m. on the morning of the 3rd her temperature was 97.8°F.; pulse rate 82 per minute. There was no pain in the abdomen, but the child was alive as foetal heart sounds could be heard. Her legs and feet were swollen and the swelling pitted on pressure. She was made to pass some urine, which on examination was found to be loaded with albumin. A diagnosis of eclampsia was made and treatment started.

Treatment.—An injection of 1/3 gr. morphia was given and 500 c.cm. of blood removed from the right arm by venesection. One hour later, 40 grs. of chloral hydras were given by mouth dissolved in 100 c.cm. of water. The patient had three fits after this. Another injection was given 3 hours after followed by chloral hydras. Chloral hydras was repeated six, twelve and eighteen hours after the first injection. The patient passed no urine during the whole day consequently it was removed by catheter at 8 p.m. The whole genitalia had swollen enormously. At 9 p.m. pains again started and at midnight the patient was delivered of a male child which lived only ten minutes. Surgical asepsis was rigidly observed during the delivery. The patient had no fits after the second dose of chloral. She was given a diuretic mixture next day and castor oil in the night. On the morning of the 5th she had three motions. During the treatment the patient was kept on plenty of milk and water. The urine was free of albumin on the morning of the 4th. The patient subsequently made an uneventful recovery.

CORRIGENDUM

IN Lieutenant-Colonel A. N. Palit's paper on 'Splenectomy for Tropical Splenomegaly' which appeared in our May issue, on p. 244, first column, thirteenth line from the top, the words 'this was one of the patients that died subsequently' should read 'it was one of these patients that died subsequently'.

Indian Medical Gazette

JULY

THE STERILITY OF VACCINES

INDIA is a country in which treatment of many diseases by injection therapy is extremely popular both among the medical profession and their patients, and of all forms of injection that of vaccines is probably the commonest, therefore care in their preparation is of the utmost importance.

Large quantities of vaccines are made by Government Laboratories in India specially equipped for the purpose where due care and attention are paid that the vaccines issued are sterile and safe. These vaccines are generally prophylactic and are used for the prevention of such diseases as cholera, plague and enteric fever, but also large numbers of vaccines, particularly the autogenous variety, are made for treatment purposes. It is in the preparation of autogenous vaccines that careful consideration is required in the selection of the micro-organism to be employed and in the preparation of the vaccine so that the issued article will be non-toxic, perfectly sterile and beneficial to the patient.

One of the most important points regarding the preparation of vaccines is to ensure, as far as is humanly possible, their absolute sterility, because serious and possibly even fatal results may follow their use if living organisms, either those from which the vaccine is made or contaminating bacteria, are injected. In India under present legislation there is no law compelling any tests to be carried out to ensure sterility before a vaccine is allowed to be issued for use or sale, so that all we have to depend on in this respect is the efficiency and conscientiousness of the person preparing the vaccine. As far as we know even in well-equipped public laboratories all that is done is a simple inoculation of a drop of undiluted vaccine on a culture medium and if no growth occurs it is passed as sterile. The cities of India contain private laboratories, many of them small and run by a practitioner as an adjunct to his practice. He may have only one imperfectly trained assistant so that in his case proper sterilization of vaccines will be doubly difficult. We do not mean to infer that such a practitioner is deliberately careless but anyone who knows the amount of sterilization of glassware that has to be carried out during the preparation and bottling of a vaccine will understand how difficult it will be to do this properly in a small laboratory with a limited staff.

The importance of this aspect of vaccine therapy has been recognized in Great Britain

for some years because the Therapeutic Substances Act of 1925 laid down certain 'standard sterility tests' which must be applied to all vaccines before they can be sold. It is considered worth while quoting these rules to indicate how stringent must be the testing of a vaccine before it can be considered safe to use.

The regulations under the Therapeutic Substances Act of 1925 applicable to the 'manufacture for sale' of various therapeutic substances including vaccines (see Second Schedule, Therapeutic Substances Regulations, 1927) lay down standard sterility tests which should be followed.

'The tests shall be made on fluid media, the quantity of medium contained in each tube or other vessel used in the test being such as to ensure that any phenolic antiseptic present in the sample is diluted to less than 0.01 per cent.

In the case of a test for aerobic organisms the medium shall consist either of a meat extract with the addition of 1 per cent of peptone, or of such an equivalent as can be prepared by the tryptic digestion of muscle. After the final sterilization the hydrogen-ion concentration of the medium shall be between the limits represented by $\text{pH} = 7.2$ and $\text{pH} = 7.8$.

In the case of a test for anaerobic organisms the medium shall consist of a nutrient broth similar to that used in testing for aerobic organisms, with the addition of heat-coagulated muscle of an amount sufficient to occupy a depth of not less than 1 centimetre at the bottom of the tube. After the final sterilization the hydrogen-ion concentration of the medium shall be between the limits represented by $\text{pH} = 7.2$ and $\text{pH} = 7.8$.

Before the test inoculation the medium shall be heated to 100°C . for a period sufficient to free it completely from dissolved oxygen, and then cooled to 37°C . or lower.

The inoculated tubes shall be incubated at 37°C . for seven days.

The reason for inoculation of the vaccine into a liquid medium so as to reduce the concentration of carbolic to less than 0.01 per cent is to ensure there are no organisms present whose growth is inhibited in the usual 0.5 per cent carbolic that vaccines contain, but which will grow when the carbolic is diluted, as it will be in the body fluids after injection.

It will perhaps be considered that these rules are too stringent and that vaccines simply tested by a single inoculation on to a solid medium are to all intents and purposes safe. In the vast majority of cases they are, but there is always the possibility of organisms being present whose presence only the above precautions will reveal, so it is worth while carrying out these tests to escape a few avoidable errors in the treatment of our patients.

How far such tests are applied in this country at present is known only to the makers of vaccines, but we venture to express the opinion that there are few who could say they carry out all the above tests for sterility, nor can they reasonably be expected to do so in the present state of the law. We have put forward the above facts in the hope that a beginning may be made in the improvement of vaccine preparation in India, and although we do not hope for such stringent regulations as we have quoted being enforced from the beginning, nor do we

consider the sudden introduction of such a complicated set of rules would work successfully where no rules at present exist, but we suggest

that the introduction of some regulations and restrictions regarding the testing of vaccines might be considered by the authorities.

Special Articles

A SMALL X-RAY BUILDING FOR A MOFUSSIL HOSPITAL

By J. C. DRUMMOND, M.Ch., F.R.C.S. (Edin.)
CAPTAIN, I.M.S.

As many mofussil towns are now being electrified and their hospitals are considering the installation of x-rays, this description of the new x-ray department at the Imambarah Hospital, Chinsurah, may be of some assistance to those contemplating a similar project. The writer has profited from errors made in two previous installations of a similar character and offers this as a suitable design for the needs of an average Sadar Hospital using a six kilowatt self-rectifying plant.

Economy in cost and space has been carefully considered—few hospitals are in a position to ignore these items—the design being cut down to the lowest figure and size compatible with efficiency. An effort has been made to avoid the faults so commonly seen in x-ray buildings in this country such as defects in light-proofing, ventilation, developing arrangements and accommodation for apparatus.

The building described consists of a main room for the plant, a dark-room and a store. It has been built on a well-raised plinth corresponding in height to that of the adjoining hospital building. The height of plinth required will, of course, vary in different localities, but the necessity of keeping the plant dry during the monsoon must be borne in mind. It was first decided to build the plinth on arches to enable under-floor ventilation to be provided, but this plan was abandoned owing to the probability of mould, stagnation and smells developing in the humid conditions of Bengal. In dryer parts of the country, however, it would probably be satisfactory.

Having decided on a solid plinth, the problem of light-proof ventilation was solved by making oblique shafts through the walls at floor level and fitting them with baffle plates. In the case of the dark-room an additional precaution was taken of fitting a hood over the outside of the ventilating shaft. The result was both efficacious and cheap. In the store room, where light-proofing is unnecessary, additional high-level ventilation of the conventional type was fitted.

The main room has internal dimensions of 17 feet by 16 feet, which gives ample room for both x-ray and diathermy apparatus. There are

four windows with well-fitting shutters, the latter being panelled in place of the usual *jhimils*. The door is flush with the floor so that a trolley may be wheeled in without having to go over a door frame. On the bottom of the door on the inner aspect is a 3-inch projecting ledge to minimize light leakage under the door. The plaster of the walls has a chocolate dye incorporated in it, and is painted over with a dull chocolate paint. The floor is of patent stone, chocolate with a black border. The resultant colour scheme is both attractive by daylight and suitable for screening when the room is darkened.

The dark-room opens from the main room through two doors with a small intervening enclosure. This double door system, apart from offering increased protection against light leakage, makes it possible for a person to enter or leave the dark-room while development is actually in progress. The walls of both the dark-room and the intervening enclosure are of black plaster and the floors of black patent stone. On two sides of the room black ferro-concrete shelves are built in, sloping gently to a sink of similar material in one corner. Over the sink at a suitable height is a ball-valve cistern for water storage.

In places where water pressure at the taps is maintained for twenty-four hours, the cistern may be omitted, but on no account should a cistern be placed outside in the sun, as this would make the water too hot to be used for washing the films.

The dark-room window has wooden panels and is made to open. The joints are protected against light leakage by separate laths on hinges. One panel is of ruby glass with a sliding shutter. This is a provision against possible break-down of the electric safelight during development and it may also be used for viewing films before fixation is complete. It had been intended to put a canvas or *chick* shade outside the dark-room window to keep off the direct rays of the sun, but this was found to be unnecessary. Leakage of light through the drain of the sink and through the floor scuppers is avoided by the use of angled pipes.

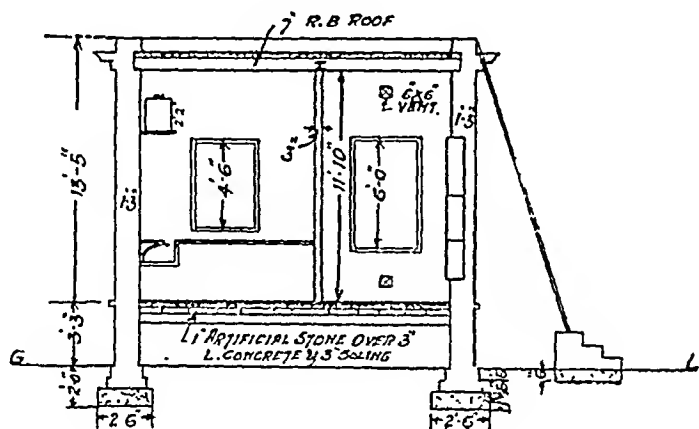
The store room is provided with a built-in *almirah*, the bottom shelf of which is lead-lined for storage of undeveloped films. As light-proofing is not required in this room, the walls and floors are of brighter colours and both floor- and ceiling-level ventilation are provided.

The power supply in Chinsurah being A.C., no space for a rotary converter is provided,

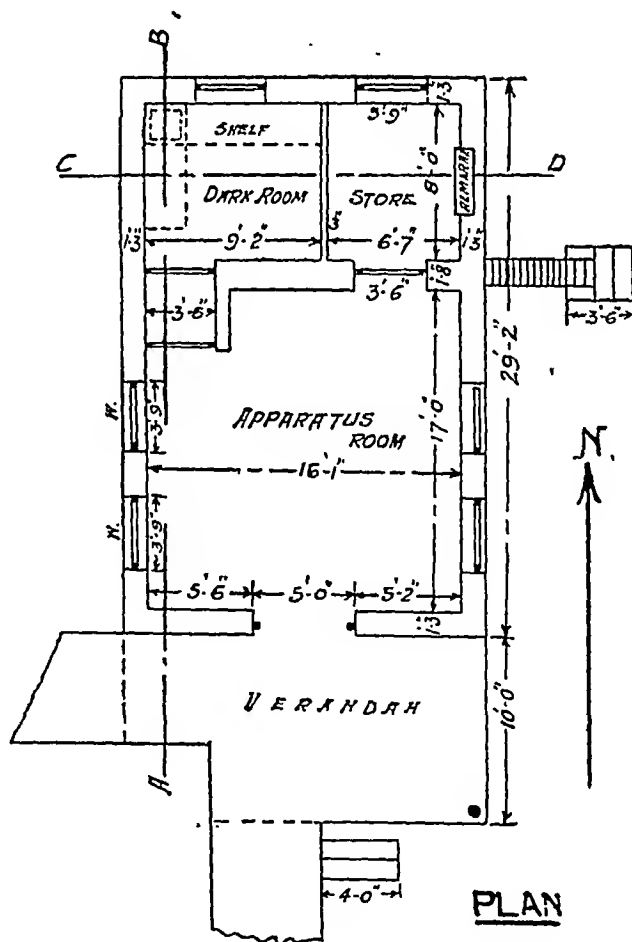
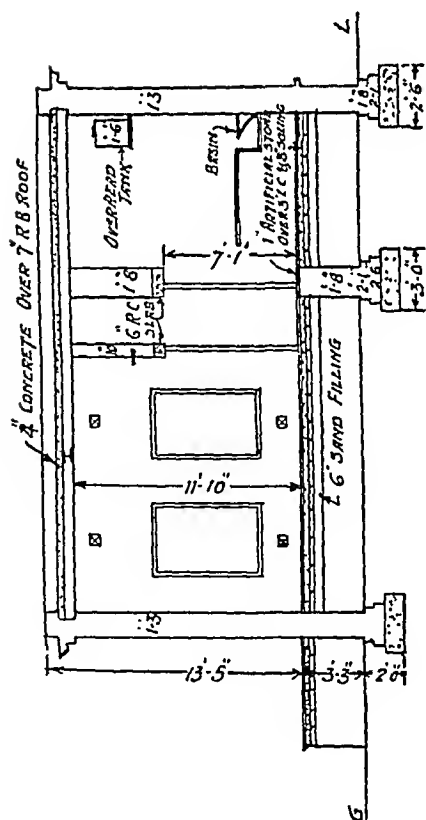
In conclusion the writer wishes to acknowledge his indebtedness to the donor, Babu Rishi

Plan of X-ray and Electro-medical Department attached to Imambarah Hospital at Chinsurah, 1934.

SECTION ON C.D. SCALE 8' = 1'



SECTION A.B.



but it is suggested that for D.C. supply the rotary converter could be housed in the store room.

Kesh Sen, not only for his generosity in supplying the funds, but also for his work in supervising the constructional details.

THE ESSENTIALS OF BORE-HOLE LATRINE CONSTRUCTION

By P. A. MAPLESTONE, D.S.O., M.B., CH.B., D.T.M.
(From the Helminthological Research Laboratory
School of Tropical Medicine, Calcutta, Endowment
Fund)

BORE-HOLE latrines appear to be one of the most efficient as well as the cheapest type of latrine for primitive rural communities and the one which it is easiest to induce people to use, especially those to whom sanitary disposal of excreta is a comparatively new idea.

The points detailed below and which are regarded by the writer as the essentials have been largely taken from the writings of C. H. Yeager of the Rockefeller Foundation, which have appeared in the *Malayan Medical Journal* in 1929, and in the *Philippine Journal of Science* in 1931.

The diameter and depth of the hole are two things that must be decided upon before ordering the necessary tools. The "best size" for general purposes is a hole 14 to 16 inches in diameter, so an auger of this size must be obtained. There are many augers on the market but the simplest, most generally efficient and cheapest is the type made by Messrs. Iwan Bros. in the United States of America. This is the only boring tool needed for soil of average consistency such as occurs in most tea districts, but should hard ground or loose sand be encountered modified boring tools will be required. Augers of this type are now obtainable locally (figure 1).

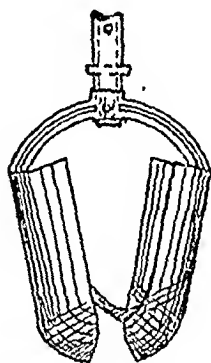


Fig. 1.—Iwan auger (after Yeager).

It is an advantage to make the hole deep enough to enter the sub-soil water level at the dry time of the year, so this should be done if possible. The reason for this is that such a hole, containing water permanently, acts more or less as a septic tank and liquefaction of the stools occurs. The result is that practically all the contents of the latrine will percolate away through the soil, it will not become rapidly filled with solid matter, and will in consequence operate for an almost indefinite period. For the sake of convenience in description we will consider the making of a hole 20 feet in depth.

Shafting of 22 to 23 feet in length will be needed for attachment to the auger to bore a

hole 20 feet deep. For the average soft soil one is likely to encounter in tea gardens galvanized or black piping $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in internal diameter should be strong enough. This shaft can of course be in a single length or it can be jointed so that extra lengths are added as the auger descends. The jointed shaft is easier to transport and handle but it will be more expensive.

Handles for turning the auger are needed, and the simplest form of these is a pair of large pipe-wrenches. If the handles of these wrenches are too short extra leverage may be obtained by slipping a length of pipe over the wrench handle after it is attached to the boring shaft. Such wrenches are often in stock in an engineering store of average equipment, but if they have to be bought specially they will add materially to the total cost of the equipment. A form of turning handle recommended by Yeager is easily and cheaply made locally. This consists of a fourway water-pipe joint of greater diameter than the auger shaft, it is drilled through the centre with a $\frac{5}{8}$ -inch hole and two lengths of pipe of suitable length (about 4 feet) are screwed into two of the opposite openings in the joint. The shaft of the auger is also bored through both sides with a $\frac{5}{8}$ -inch hole about every 2 feet of its length. The handle is slipped over the shaft and can be easily attached to it at any suitable height by a $\frac{5}{8}$ -inch steel pin (figure 2).

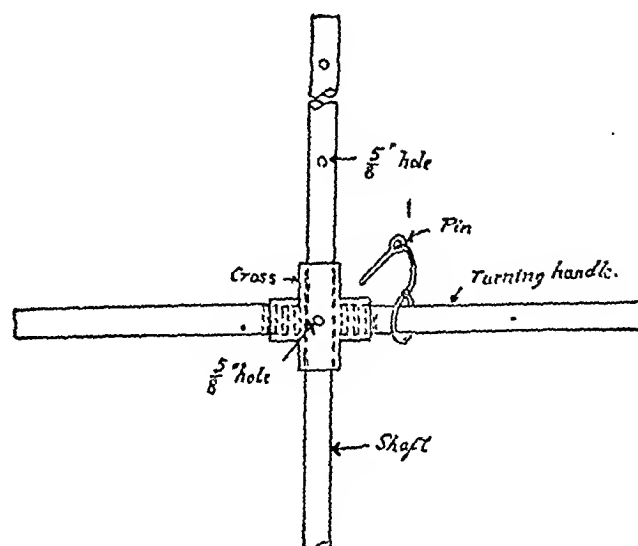


Fig. 2.—A turning handle (after Yeager).

The auger has to be lifted and emptied every time it becomes filled with earth so some arrangement for obtaining a vertical lift is a great help as the sides of the hole will not be damaged by the constant raising and lowering of the auger if this is done. A compound pulley with a double block at the top and a single block at the bottom will supply sufficient mechanical advantage to ensure easy and steady

raising of the auger. A tripod of bamboo poles or piping 25 feet in height is erected over the hole with the double pulley block attached to its top; the single block hangs at the lower end and it has a hook beneath it which can be let down the hole to engage the arch of the auger, or in the case of the shaft drilled for the attachment of the turning handle it can be attached to one of the holes in the shaft. A lighter and more easily transported and erected hoisting frame can be made with two poles joined together at one end and erected over the hole in the form of an inverted V. This is held in place by a guy-rope at each side passing from the top of the frame to pegs in the ground.

A platform with a central hole for passage of the auger shaft and consisting of two hinged trap-doors on a frame is not a necessity, but is a great help in holding the auger vertical during the process of boring if placed on the ground over the hole (figure 3). More elaborate types of brace can be bought but they are all fairly expensive and are no more efficient than the above 'home made' one.

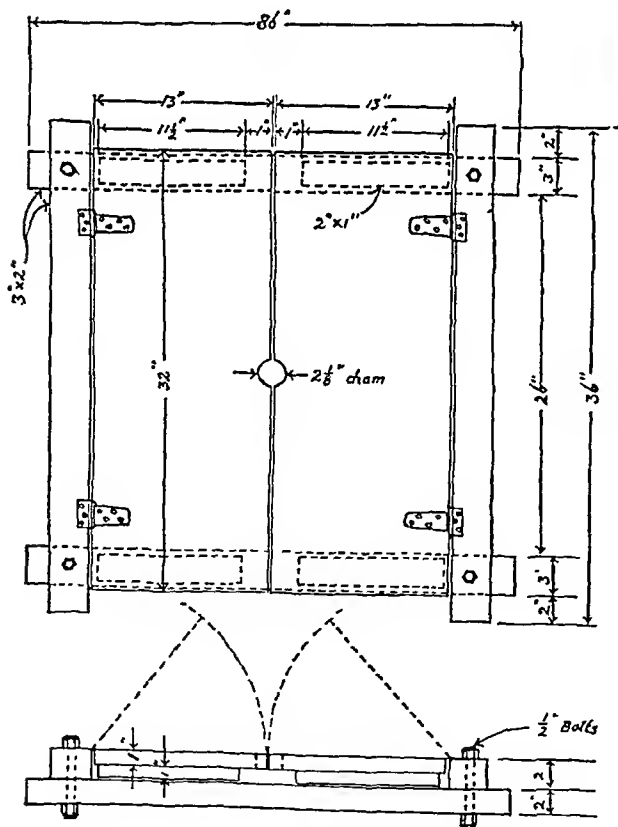


Fig 3—Trap-doors on frame to hold shaft vertical during boring (after Yeager).

In some soils a casing may be needed to prevent the soil from caving in and filling the hole. A casing woven from split bamboo has been used with success and will last a long time. Concrete casing for the whole depth of the hole

would be very heavy and expensive, but in places liable to flooding a watertight casing in the upper part of the hole is necessary. This is to prevent faecal matter being washed out of the hole and spread over the surface of the ground, perhaps even being carried into wells by flood water. Reinforced concrete will be found the best for this purpose in all probability, but such things as old oil drums roughly joined end to end will serve if they happen to be available. This casing need not extend very far into the hole but it must project out of it for a sufficient height to be above the level of the probable flood water. If it is necessary to put in this casing it must be packed round with a mound of earth up to its top to carry the squatting plate.

It will probably be found that the squatting plate can be most cheaply made locally and the following figures taken from Prasada (1934) will serve as a guide for the required dimensions. It is 3 feet in length by $2\frac{1}{2}$ feet in breadth, dished $1\frac{1}{2}$ inches from edge to centre and the thickness throughout is 2 inches. The back of the hole is 6 inches from the back edge of the plate and it is 14 inches in length, being 4 inches wide at the front and 5 inches at the back (figure 4).

A squatting plate is essential for several reasons:

1. It prevents the edges of the hole caving in.
2. It prevents the soil surrounding the hole being contaminated with faeces and thus supplying a source for hookworm infection.
3. It can be readily cleaned if it becomes soiled.
4. It prevents small children falling down the hole.

A superstructure of some kind is required over the latrine to make it private, and this can be made of similar material to that employed for the coolies' huts. The advantages of this type of building are that the materials will be obtainable on the spot and the erection can be done by the coolies themselves, each one building his own shelter. Another possibly important point in supplying a building of a type to which the coolie is thoroughly familiar is that he is much more likely to willingly enter such a hut than a strange one of wood, brick or iron. An important point in the erection of the protecting building is to see that the walls are in close contact with the edges of the squatting slab as this will prevent the surrounding soil becoming infected if the latrine becomes dirty, and even if the earth did become infected persons entering the latrine could not come in contact with it from the inside.

If properly constructed and kept clean these latrines are remarkably free from smell so that they can be placed quite close to the houses, and the nearer they are the more likely are they to be used at night or when there is heavy rain.

As far as information is available on the subject it appears that it is safe to allow these latrines to be established to within 100 feet of wells in homogeneous and fine soil without cracks or

PLAN OF SQUATTING PLATE.

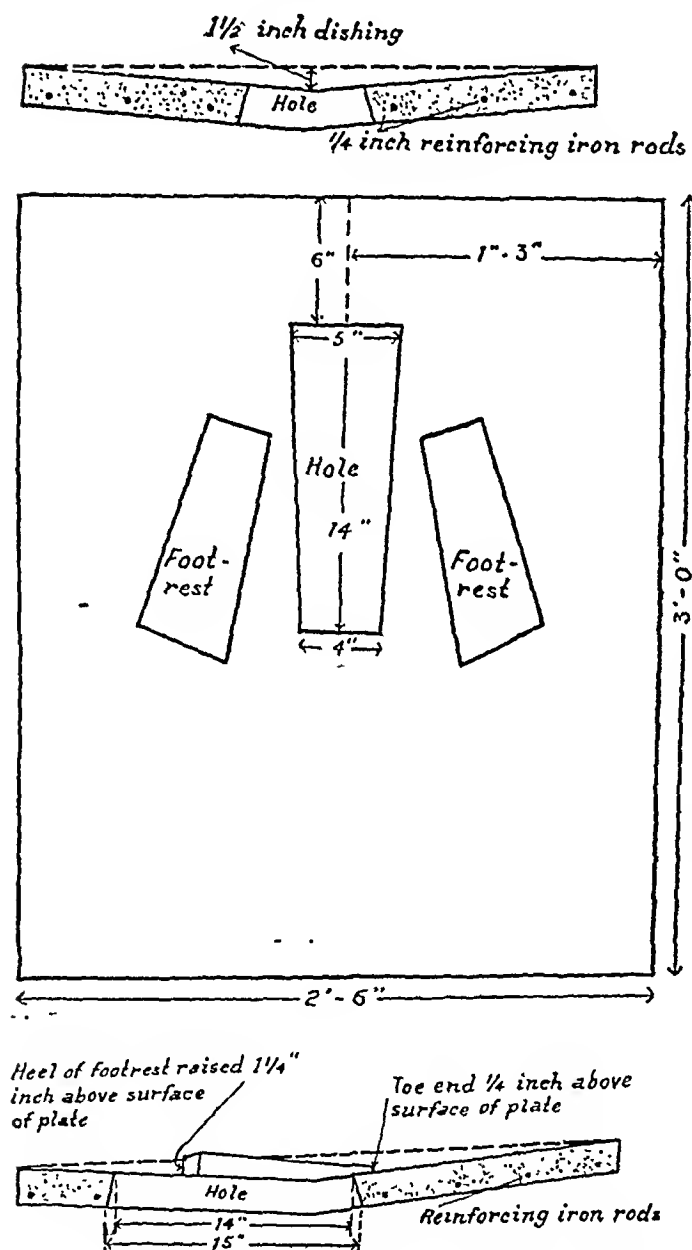


Fig. 4.—Plan, front and side elevation of squatting plate (after Prasada).

faults, as all the harmful bacteria will be filtered out of the effluent in less than that distance (Yeager, 1929). It is noted in this connection that Prasada (1934) says 50 feet is considered far enough from wells at Partabgarh.

One of the precautions to ensure the successful working of this type of latrine is to see that each hole is not used by too many individuals, otherwise it will become filled rapidly. Five or six persons can safely use a latrine of the dimensions we have described for a long period, probably several years, if it contains water and

satisfactory liquefaction of the contents takes place.

This is only a brief outline of the main points and precautions to be observed in constructing bore-hole latrines, together with a description of the minimum of equipment needed to do the work satisfactorily. Many alterations and improvements will no doubt be effected to suit special local conditions in certain places by individuals, especially those with ingenuity and engineering knowledge and with a little elasticity in the expenditure allowed, but it is hoped that this note will serve as a basis on which to begin operations.

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 Yeager, C. H. (1929). Well Pollution and Safe Sites for Bored-hole Latrines. *Malayan Med. Journ.*, Vol. IV, p. 118.
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Medical News

NATIONAL INSTITUTE OF SCIENCES OF INDIA

WE have just received the first issue of the Proceedings of this institution. It gives an account of the formation of the institute at the beginning of this year and the aims and objects of the organization.

In time to come this institution will be most valuable to science in India, for its purpose is to co-ordinate the work of the various scientific bodies throughout the country and to publish in the Proceedings summaries of practically all the scientific matter of importance that is published in India. This will make it an extremely valuable production and one with a world-wide circulation assured. The first number is well produced and closely follows the style of the best English scientific publications, so that as well as being a necessity to all scientific libraries it will be an acquisition on account of its appearance.

TWENTY-SEVENTH ALL-INDIA MEDICAL LICENTIATES' CONFERENCE, INDORE

THE Twenty-Seventh Annual Session of the All-India Medical Licentiates' Conference was held at Indore in a specially arranged pandal in the compound of the King Edward Hall on Wednesday afternoon, Sir James Roberts, Kt., C.I.E., I.M.S. (retired), Member of the Council, Dewas Sr. State, presided. A number of delegates from different parts of India attended the conference.

The chairman, in reviewing its manifold activities in varied branches, alluded to the ceaseless endeavours to remove the stigma of inferiority which had unfortunately attached itself to the class of licentiates. Proceeding, Dr. Khandekar surveyed the rapid advance recorded in raising the standard of preliminary qualifications of medical schools and bringing them into line with the course prescribed for registered medical practitioners.

Adverting to the work that remained to be done in improving the lot of the medical licentiates, the chairman thought it fortunate that the Director-General of Medical Services should continue to lend his support to their cause.

The passage of the Indian Medical Council Bill in the Legislature with such haste was, in the opinion of the speaker, an affront to the association which at the present critical juncture was deprived of the valuable services of such brilliant advocates as the late Dr. K. D. Lohakare who had consistently championed their cause in the Legislature.

Concluding, the speaker stressed the need for a properly equipped school of pharmacy. To assist research work the association had set apart Rs. 10,000 and the speaker pleaded for the recommendations of the Drugs Committee appointed by the Government of India being carried into immediate effect.

This was followed by the annual report read by the secretary which led to lively discussion on several points.

On the evening of the first day an exhibition of scientific and sanitary appliances was opened by the Maharaja of Indore. The second day was devoted to committee work, and on the third day there was a final general meeting when the following resolutions were adopted:

(1) The Government to (a) increase the course of licentiates to 5 years in all medical schools, (b) include them in the Indian Medical Council, (c) give increased representation in the Provincial Medical Councils, (d) enunciate a definite policy regarding honorary appointments in hospitals; (2) the Indian Medical Association to work for the statutory recognition of the licentiates and to bring about uniformity of medical qualifications in India; (3) the universities to allow the licentiates to appear for the M.B., B.S. examination without the restrictions laid as in the Madras University, and (4) the insurance companies to remove the distinction that they make between the licentiates and the graduates regarding the payment of fees for medical examination.

THE SEVENTH INTERNATIONAL MEDICAL POST-GRADUATE CONGRESS

THE Tomarkin Foundation is organizing, under the auspices of the University of Brussels, its Seventh International Medical Post-Graduate Congress officially approved by the General Commissariat of the Government for the World Exhibition.

This congress dealing with diagnostic and therapeutic actualities will be held during the World Exhibition from the 12th to 19th September next in the Faculty of Medicine of the University in Brussels and from 20th September to 2nd October at Spa.

For all particulars please apply to the Secretary, Tomarkin Foundation, Faculty of Medicine, 97, Rue Aux Laines, Bruxelles (Belgique).

THESIS PRIZES

NOTICE is hereby given that the subject for the Dr. Joseph Benjamin thesis competition prize essay for the year 1935 of the value of Rs. 35 (thirty-five) is 'Prevention and Treatment of Malaria' and that for the Dr. Ramchandrier thesis prize for the same year is 'Prevention and Treatment of Cholera'. The value of this prize is Rs. 25 (twenty-five).

All bona fide members of the association (All-India Medical Licentiates' Association) are entitled to compete.

The thesis papers should not be of more than 1,000 (one thousand) type-written lines or their equivalent.

Intending candidates are requested to send their papers to Dr. Joseph Benjamin, President, Gujrat Branch of the All-India Medical Licentiates' Association, Dalgawada, Ahmedabad, so as to reach him on or before the 30th November, 1935.

Notice is hereby given that the subject for the Dr. Joseph Benjamin thesis competition prize for the year 1934, as published in the *Indian Medical Journal* of July 1934 issue, page 415, of the value of Rs. 35 (thirty-five) on the subject of 'Ante-Natal Diseases,

their Care and Treatment' is extended to 30th September, 1935, and that all bona fide members of the Association (A.I.M.L.A.) are requested to compete for the same.

Intending candidates are requested to send their papers to Dr. Joseph Benjamin, President, Gujrat Branch, Dalgawada, Ahmedabad, so as to reach him on or before the 30th September, 1935.

The thesis paper should not be of more than one-thousand type-written lines or their equivalent.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE

At the next congress it is proposed to hold a round-table discussion on nutrition, and we have been asked by the council to make preparation for it.

Papers are invited upon nutrition from the widest point of view and we should be glad if trained observers, who are working on any aspect of the subject in this country, will kindly contribute to the discussion by reading a paper on their work under any of the sub-headings below.

If suitable support is forthcoming, it may be possible to combine the papers received and the discussions in a volume, which would constitute an up-to-date account of nutrition as concerns the East.

It is hoped that some indication of the support which may be expected may be received during 1935, though it will not be necessary for titles of papers to be sent in until a later date which will be notified in due course. Such co-operation will enable the council to know how much time should be allotted for the discussion.

It has been proposed to divide papers under three headings as follows:—

I. Economics to include such aspects as agriculture in relation to human nutrition, *e.g.*, improvement of yield and quality of food crops; horticulture; fruit-growing; stock raising; dairy problems; institutional feeding; food surveys; storage; cooking, etc., etc.

II. Chemical and physiological to include food analyses in the widest sense; vitamin, mineral, fat, protein studies, etc.; metabolism, basal metabolism, energy requirements, specific dynamic action.

III. Clinical studies of disease in relation to food and diet, the feeding of infants during the first year with special reference to development (height and weight); children's diseases in relation to food; nutritional oedema, atypical beriberi; the course of infectious diseases under the influence of food; liver cirrhosis; anemias; skin diseases in relation to food and vitamins; ulcers of the leg; leprosy in relation to food; constitutional diseases, diabetes, obesity, gallstones, gastric ulcer, etc.; clinical value of certain foods, etc.

It should be understood that the above provisional programme is intended to be as wide as possible, and that additional suggestions from those able to make them will be welcomed. It is hoped that the subject of nutrition will receive emphasis from the general and normal point of view as well as from the point of view of disease.

All correspondence should be addressed to: The Director of Public Health, Parapattan 10, Batavia-c., Java, Netherlands, India.

ALL-INDIA OPHTHALMOLOGICAL SOCIETY

FOURTH CONFERENCE

THE above society held its fourth conference at Madras on the 22nd, 23rd and 24th April, 1935. The president elect was Lieutenant-Colonel R. E. Wright, I.M.S. On the first day, Dr. E. V. Srinivasan, on behalf of the reception committee, welcomed the members; the secretary, Dr. G. Zachariah, next introduced Sir Mahomed Usman, who opened the session with a short address which dealt with the history of the Government Ophthalmic Hospital, Madras, and its influence on the spread of ophthalmology in India,

particularly in the direction of post-graduate teaching of recent years. Colonel Wright then delivered the presidential address. In the afternoon a number of papers were read on 'Nutritional disorders of the eye'. The discussion, centred chiefly around keratomalacia or xerophthalmia (these terms being used by speakers as equivalent to the congeries of pathological changes resulting from a polydeficiency in which avitaminosis 'A' appears to play a predominant part). This common condition, familiar to workers in the East for many years, plays a prominent rôle as a cause of preventable blindness. Contrary to views expressed by recent workers in England and elsewhere, skin rashes were not considered more frequent in keratomalacia than in the general hospital population, with the exception of lichen pilaris. The same applies to pyogenic infections in general. The view was expressed that many laboratory workers were unfamiliar with the well developed human disorder as it occurs in bulk; hence certain divergencies of opinion in recent literature.

On the second day, the sessions were held in the Elliot School theatre of the Government Ophthalmic Hospital. An interesting programme of twelve short papers was given by members of the hospital staff on:—

Sympathetic ophthalmia.
Occlusion of the central artery.
White rings of the cornea.
Corneal opacities due to sugar of lead.
Corneal ulcer due to *Glenospora graphii*.
Simple xerosis conjunctivæ.
Tuberculosis conjunctivæ.
Leptothricosis conjunctivæ.
von Hippel's disease.
Birth injury of the cornea.
Clinical aspects of glaucoma.
Modern methods of anæsthesia in ophthalmic practice.
Rare complications of cataract extraction.

The paper on sympathetic ophthalmia read by Dr. K. Koman Nayar showed that the Government Ophthalmic Hospital experience was that this condition was less frequent in Indians than in Europeans. Discussion showed that this was not the universal opinion, Dr. B. K. Narayana Rao (Mysore) was in opposition to the view. Members were enabled to examine the extensive collections of intracranial lesion radiographs, water-colour pictures and stereo-photographs of external diseases of the eye, and the various other exhibits of the museum. A number of clinical cases were demonstrated including a group of 20 patients showing the various manifestations of keratomalacia, patients with acne rosacea, von Hippel's disease, Groenouw's keratitis, xeroderma pigmentosa, thrombosis of the central vein, and two keratoconus cases, the last three by Dr. Narayana Rao. Other papers read were on the 'Rôle of anæsthesia in ophthalmology' and 'Three cases of Groenouw's disease'. Prevention of blindness was discussed at the end of the afternoon session following an exhibition of coloured posters and lantern slides prepared for the Association for the Prevention of Blindness, Bengal, by Lieutenant-Colonel E. O'G. Kirwan. Red Cross posters designed in New Delhi and local Madras posters were also exhibited.

The final session was held in the library hall of the Madras Medical College. Papers were presented on:—

The importance of the study of field of vision on the prognosis and treatment of epidemic dropsy glaucoma.
Detachment of the retina, 26 cases.
Ocular complications due to focal sepsis.
The effects of subconjunctival injections of guaiacal cacodylate in phlyctenular keratoconjunctivitis.
Asepsis of the conjunctival sac.
Some observations on slit-lamp microscopy.
Treatment of immature senile cataract.
Cataract extraction in Aligarh.
Blue sclerotics with congenital syphilis.
Buphthalmos and blue sclerotics.
Diphtheria of the conjunctiva.
Unilateral trachoma.

A short history of incidence of glaucoma in Bengal. Ophthalmoplegic migraine involving the sixth nerve.

The subject of greatest interest was primary non-congestive glaucoma, the Calcutta members bringing forward experience in connection with the recent outbreaks of epidemic dropsy. The fact that in the excessively high tensions of epidemic dropsy glaucoma, field changes and disc changes might be absent for months elicited interesting discussion. Decompression by sclerocorneal trephining was still employed extensively in Calcutta, hundreds of operations having been done in the last few months.

In connection with the prevention of blindness, it was considered by the committee that the responsibility of the governing authorities was insufficiently realized and that certain recommendations should be put before the various authorities in British India and the Indian States. These will appear in due course.

About sixty members attended.

At about the same time that we received the account of this meeting we also received volume III of the Proceedings of this society. This is a volume of about 200 pages nearly all of which is devoted to the papers communicated at the meeting held in Calcutta in 1933. Apart from the opening and presidential addresses these papers numbered 34 and are a valuable collection of observations covering a wide field in the science of ophthalmology. The book is clearly printed and contains a number of well-executed coloured plates illustrating certain of the papers. The society is to be congratulated on this production, and we look forward to the issue of volume IV the contents of which are indicated in the above notice of the Madras meeting.

THE DACCA MEDICAL SCHOOL DIAMOND JUBILEE CELEBRATION

THE Diamond Jubilee celebration of the Dacca Medical School on completion of 60 years and the re-union of past and present students will take place in the Dacca Medical School on or about the first week of July 1935. Past students of this school are requested to join the function and contribute their quota.

ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH, CALCUTTA

THE attention of our readers is drawn to two advertisements in this issue regarding the courses of instructions for the D.P.H. and D.P.H. & Hy. examinations which will commence from the 15th October, 1935, in collaboration with the School of Tropical Medicine, Calcutta, and also the next course for the Diploma in Maternity and Child Welfare commencing from the 15th October next.

INDIAN MEDICAL BIRTHDAY HONOURS, 1935

THE following are the names of medical men and others, associated with medical institutions, in the Indian Honours List of date 3rd June, 1935. We offer them our congratulations:

C.I.E.

Lieutenant-Colonel B. Hogham, Indian Medical Service, Chemical Analyser, Bombay Government.

Lieutenant-Colonel R. Knowles, Indian Medical Service, Professor of Protozoology, Calcutta School of Tropical Medicine.

C.B.E.

Miss M. V. Webb, Chief Medical Officer, Women's Medical Service, and Secretary of Funds under the Presidency of Her Excellency the Countess of Willingdon.

O.B.E.

Mr. H. S. Hensman, Superintendent, Government Mental Hospital, and Lecturer in Mental Diseases, Medical College, Madras.

M.B.E.

Dr. Daw Saw Sa, Private Medical Practitioner, Burma.

Miss W. Thompson, Lady Doctor, St. Luke's Hospital, Chabua, Assam.

Mr. Ethirajulu Nayudu, Assistant Director of Public Health, Madras.

Mr. L. J. A. Rogers, Assistant to the Surgeon to H. E. the Viceroy.

I.S.O.

Mr. W. A. D'Castro, Personal Assistant to the Inspector-General of Civil Hospitals, Rangoon.

Mr. Manwa Ram, Superintendent, Medical Branch Headquarters, Kohat District.

Mr. Muhammed Abdur Rahim, Upper Division Hospital Writer, Hyderabad, Deccan.

*Kaisar-i-Hind Medal**First Class*

Miss E. G. Stuart, Church of England Zenana Mission Society Hospital, Quetta.

*Kaisar-i-Hind Medal**Second Class*

Miss B. Lee, In charge of the Leper Asylum and Orphanage, Uska Bazar, Basti, U. P.

Miss V. Laupers Lauders, Matron, General Hospital, Mandalay.

Miss C. Norris, Mure Hospital, Nagpur.

Miss E. Scott, Senior Nurse, Northcote Police Hospital, Bombay.

Mr. A. B. Cooke, Medical Officer, Salvation Army Hospital, Anand.

Mr. R. V. Shiveshwarkar, Assistant Director of Public Health, Ahmedabad.

*Kaisar-i-Hind Medal**Third Class*

Miss A. Jankinath, Assistant Superintendent, A. P. Memorial Hospital, Fatelgarh.

Mrs. R. Rangacharya Puranik, Lady Superintendent, Dharwar Vanita Seva Samaj, Bombay.

Mr. B. J. Ajwani, Public Health Officer, Sukkur Municipality.

Mr. K. N. Lahari, Medical Practitioner, Gorakhpur.

Diwan Bahadur

Rao Bahadur C. Natesa Mudaliyar, M.L.C., Private Medical Practitioner, Madras.

Rai Bahadur

Mr. Janki Prasad Gupta, Medical Officer, Sadar Hospital, Kheri-Lakhimpur, United Provinces.

Dr. Narbada Prasad Shrivastava, Superintendent of Jails and Civil Surgeon, Khandwa.

Mr. Jatindra Mohan Sikdar, Civil Surgeon, Nowgong, Assam.

Rao Bahadur

Dr. Rajayya Robert Williams, Civil Surgeon (retired), Madras.

Mr. Vinayak Balvant Gokhale, Civil Surgeon, Belgaum, Bombay Presidency.

Vaidyaratna

Dr. Melappakkam Duraiswami Ayyangar, Ayurvedic Doctor, Madras.

Rai Sahib

Babu Jaishi Ram Mehta, Medical Officer of Health, Chandausi, Moradabad District.

Lala Ganga Bishen, Civil Surgeon, Punjab Civil Medical Service, Ludhiana.

Babu Sailendra Chandra Sen, Assistant Surgeon, Gaya Pilgrim Hospital.

Mr. Emmanuel Bunyan, Private Medical Practitioner and Honorary Magistrate, Mhow, Central India.

Mr. Munindra Nath Ghose, Government Chemical Examiner, Calcutta Custom House, Bengal.

Current Topics

Anæmia in Pregnancy

By DANIEL T. DAVIES, M.D., B.S.C., F.R.C.P.

(From the *Practitioner*, Vol. CXXXIV, March 1935, p. 290)

ALTHOUGH pregnancy is a physiological and natural state it occasionally results in derangements of the maternal metabolism so as to produce or activate pathological conditions. It is not uncommon for a latent disorder to become active during this period. A woman who during normal times is able to maintain a normal blood count may during this period of increased demand become progressively and severely anæmic. The offspring depends solely on its mother for a proper and sufficient supply of blood-building substances, which must be adequate to maintain the growing infant over the milk-feeding period. Bunge showed that the liver of a newly-born animal contains weight for weight six times as much iron as the liver of an adult animal and that this iron content of the liver progressively decreases during the milk-feeding period, until the animal is able to ingest iron-containing foods, when it again increases. This increased iron content of the newly-born animal can only be derived from maternal sources and this transfer must on occasion so deplete the maternal reserves as to produce a failure of hæmoglobin manufacture. However anæmic the mother it is usual for the child to be born with a full complement of hæmoglobin, although recent work by Strauss shows that infants of women suffering from anæmia often

develop a severe anæmia during the first year of their lives. It is probable that the supply to the foetus has been deficient *in utero*.

The anæmias occurring during pregnancy can be roughly divided into two groups—the hypochromic which is relatively common and the macrocytic which, in this country, is rare. This latter form, however, is commoner in tropical countries, especially in certain parts of India, where the extremely restricted diet is probably responsible in large measure.

Hypochromic anæmia in pregnancy

A mild degree of this hypochromic anæmia is common in women drawn from industrial areas. Whereas idiopathic hypochromic anæmia is almost a curiosity in the male, any outpatient department furnishes a large collection of this type of anæmia in women. An interesting study bearing on this problem was made recently by Davidson and his colleagues at Aberdeen; they found that the daily intake of iron in the poorer classes was much below what has been regarded as necessary. Many of these families existed on an average intake of not more than 6 mg. of iron per day. This impoverished iron intake, however, was not accompanied by any anæmia unless there were some extra demands. In children up to 14 years of age and in males, in spite of a poor intake of iron, anæmia was conspicuously absent; on the other hand adult females on a similar diet showed a high proportion of anæmia. Anæmia was present in nearly 50 per cent of over

400 adult females. As Davidson points out, the iron requirement for a woman is obviously tidal and it corresponds with the normal functions of womanhood; at this period the iron intake should be optimal and not minimal. It is certainly uncommon to meet this anæmia in women who lead lives of luxury.

Provided the stores are well stocked the healthy woman passes through pregnancy without any fall in her blood count. Some attention has been drawn to the increased blood volume which is present during pregnancy and the slight reduction in red cell and hæmoglobin values which might be seen in consequence of this hydræmia during the first six months of pregnancy. Shelly and I recently followed through 45 women during their pregnancies; the average fall in hæmoglobin was only 8 per cent and the average fall in red cells 280,000 per c.mm. Any count which is below 75 per cent hæmoglobin should be regarded as pathological.

The anæmia may show itself during the first pregnancy but it is more common in multiparæ after several pregnancies. It may not be obvious until after confinement and a severe blood loss during labour may be the precipitating factor. Some patients admit that they were pale before the pregnancy but that there has been an intensification of the pallor since they have become pregnant. Usually the symptoms are more prominent during the last three months when the iron is transferred from the maternal stores to the fœtus. Many of the symptoms are often and too readily attributed to the pregnancy. The languor, anorexia, giddiness, headache and dyspnœa are often regarded by the laity as usual and 'natural' symptoms which must be tolerated. Occasionally these symptoms are misinterpreted and regarded as the early symptoms of 'toxæmia'. A rigorous restriction in diet is often advised and this results in deprivation of iron-containing foods at a time when the need is greatest.

In a woman who becomes anæmic for the first time during pregnancy there is little obviously abnormal except the pallor. If, however, she has suffered from anæmia for many years, and perhaps from exacerbations in former pregnancies, the signs of chronic anæmia are usually seen; there is a greenish tint in the sclerotics, the angles of the mouth are fissured and often painful, the tongue is red and devoid of papillæ, the hair is dry and thin, the nails brittle and spoon-shaped and spleen palpable. Some or all of these signs may be present and they indicate an anæmia of long standing and naturally intensified by pregnancy.

Examination of the blood shows a reduction in the hæmoglobin. The hæmoglobin is frequently around 40 to 50 per cent, while the red cells are 4 millions. The colour index is therefore low. The red cells are poorly stained and may show changes in shape and size, i.e., poikilocytosis and microcytosis. The outstanding feature, however, is the low hæmoglobin content, and usually advice is sought before the hæmoglobin falls below 40 per cent.

One of the most important points in examining a woman thought to be a case of this anæmia during pregnancy is a careful inquiry into her diet; the foods which contain iron, such as red meat, spinach and other green vegetables, are often absent from the diet and this is especially true of housewives of working class families who live mainly on bread and other starchy foods. This restriction of iron-containing foods is a logical explanation for the break-down during pregnancy, and it is well to explain to the pregnant female the need of iron-containing foods, as a prophylactic measure. Of 46 patients who did not become anæmic while under observation throughout their pregnancies none gave a history of a poor diet intake; on the other hand of 26 who developed hypochromic anæmia during or after pregnancy 18 took grossly inadequate diets. Castle and Strauss have also emphasized this association of inadequate diets with anæmia during pregnancy.

Another important examination which sheds light on this anæmia is the analysis of the gastric secretion. The normal acidity of the gastric juice facilitates the absorption of iron from the intestine and it is believed that in achlorhydric states much of the iron in the food is lost. Deficient absorption may be therefore superimposed on a state of deficient intake of iron, if there is a coexistent achlorhydria. A woman is most prone to develop anæmia due to iron deficiency when there is achlorhydria and especially is this true when the extra strain of pregnancy calls forth an increased demand from the iron stores. In the 20 females who were anæmic following their last pregnancy two only showed a normal gastric secretion, the other 18 presented achlorhydria or a marked hypochlorhydria. Castle and Strauss found that not only is achlorhydria of extreme importance in the development of this anæmia, but that even in the normal female there is a decided reduction in gastric acidity during pregnancy; this is corrected in the puerperium. Two patients with a good gastric secretion in the puerperium were completely achlorhydric during pregnancy.

That gastric defect may be the only explanation for the anæmia is shown by the following case: a woman, aged 28, developed an anæmia of 60 per cent hæmoglobin in the sixth month of her second pregnancy; she had not had any excessive blood loss in the past, and took a good varied diet, yet she showed an anæmia which responded to iron and which could only be explained by the presence of a permanent achlorhydria.

An exact proof of the importance of achlorhydria in this connection is forthcoming from the experimental work of Ivy and his colleagues. They have shown that the dog on which a gastrectomy has been performed can be maintained without the development of any anæmia for an indefinite period, provided the diet is adequate in iron-containing substances. When, however, the animal is allowed to become pregnant an anæmia of this type invariably occurs. In one dog this occurred in five successive pregnancies.

There is a good deal of evidence that this hypochromic anæmia is not uncommon during pregnancy, and this is in all probability the resultant of a deficient intake of iron-containing foods in women who show achlorhydria or hypochlorhydria. It is also not irrational to believe that much disability and chronic ill-health associated with pregnancy and the puerperium could be avoided by the early recognition of this disorder.

Treatment is highly successful in this form of anæmia; iron in large doses results in a rise in hæmoglobin, the disappearance of the symptoms of languor and lassitude and a feeling of well-being equal to that of any specific therapy. The only tardy response that we encountered was in a woman who gave birth to twins. It is unwise to force the liberal use of iron-containing foods if there is an existing anorexia or any abdominal upset, especially since iron in the shape of its salts will accomplish the necessary improvement in a much shorter time. A daily dose of 90 grains of citrate of iron and ammonia is usually well borne. It is an advantage to prescribe the iron some two hours after food to be followed by a sweet orange drink, although the iron is usually well tolerated. The dose of 90 grains a day should be administered until the hæmoglobin reaches a level of at least 80 per cent, and it is a good plan to continue with one daily dose (gr. 30) until the pregnancy is over. If in the puerperium the gastric analysis be repeated and a normal amount of hydrochloric acid be found, iron medication can be dispensed with; if, however, achlorhydria persists the need for iron will be permanent and it should be given at least periodically until after the menopause.

Macrocytic anæmia in pregnancy

This form of anæmia is certainly far less common than hypochromic anæmia as an event in pregnancy. Its importance, however, is that it may appear very

suddenly and seriously endanger life. It is interesting to recall that one of the first references to an anæmia of pernicious type was that by Channing, an American obstetrician in 1842. This anæmia shows the blood characteristics of Addisonian anæmia and its response to liver therapy is equally certain. There is, however, one important distinguishing feature which was well realized in pre-liver days and, namely, that the patient showing this 'pernicious anæmia' during pregnancy frequently recovered spontaneously, in sharp contrast to the then fatal issue of ordinary pernicious anæmia.

Since Addisonian or pernicious anæmia is now easily corrected with substitution treatment, it is of course possible to meet a patient known to have had pernicious anæmia and now pregnant. The strain of pregnancy might be responsible for a relapse which would call for energetic treatment; case records have established this sequence of events. Pregnancy may also precipitate pernicious anæmia in a female predisposed to its development by reason of a gastric defect. These events are of necessity rare for pernicious anæmia usually occurs in women past the child-bearing period. The macrocytic anæmia induced by pregnancy cannot be regarded as identical with Addisonian or pernicious anæmia. It is true that there is macrocytosis, and that there is great reduction in the red count and a high colour index. The spontaneous remissions, however, place it in a category of its own; another important feature is the inconstancy of any gastric abnormality, for many patients have shown a normal acidity.

The anæmia may be gradual in its onset or it may develop with great rapidity during the last trimester of pregnancy. Associated with the pallor there is often a slightly yellowish tint to the skin and this may be accompanied by subcutaneous œdema if the anæmia is severe. There is also frequently a fever and a tendency to premature labour, as the existence of œdema may suggest a renal lesion and the real cause remain untreated. If, as sometimes happens, the anæmia appears in the puerperium, the accompanying fever may suggest puerperal sepsis and treatment directed to this condition result in neglect of the anæmia. Several writers have described the obstetric shock which accompanies delivery and emphasize the importance of adequate treatment before this takes place. Recurrences in future pregnancies have often been observed and Whitty believes that in some cases a degree of hypoplasia of the marrow is produced, a condition in which the response to treatment becomes particularly resistant.

The exact cause of this anæmia is unknown, the gastric juice is often normal and there is certainly no obvious dietetic factor. Castle and Strauss, who showed that there is such reduction in gastric acidity during pregnancy, suggest that it is due to a temporary arrest of secretion of the intrinsic factor. It may be that many causes operate and that the condition is a non-specific failure of blood formation. In the macrocytic anæmia as seen in India, Wills has shown that in all probability the cause is a lack of the extrinsic factor in the diet.

The treatment of the condition is the same as that of pernicious anæmia, and the earlier the treatment is instituted, the less risk the mother runs. If the anæmia is severe the active principle should be given intramuscularly. In those whose condition is desperate or in whom labour is imminent a blood transfusion is life-saving. Cæsarean section preceded by a blood transfusion is the method of choice when the patient is seen at term to be severely anæmic. Since auto-agglutination is a potential danger much care is necessary in testing the blood prior to transfusion. Provided the gastric secretion is normal treatment can be discontinued after delivery when the blood has returned to normal. If, however, there is achlorhydria it is safe to regard the patient as an example of pernicious anæmia in need of constant supervision and treatment.

Favourite Prescriptions

By CECIL WALL, D.M., F.R.C.P.

(Abstracted from the *Practitioner*, Vol. CXXXIV, February 1935, p. 226)

Aperients.—Probably aperients are the most extensively used medicines in hospital practice. The official Black Draught, which seems to have obtained an impregnable position in the British Pharmacopœia, is too expensive for hospital use; it is represented now by the Haustus aperient:—

R Magnesium sulphate .. grains 150
Emulsion of chloroform .. minims 7½
Infusion of senna .. 1 oz.

Chloroform is introduced partly as a flavouring agent and partly as a preservative. The emulsion of chloroform is made with tincture of quillaia and is less expensive than the solution in spirit.

The cascara mixture is another favourite aperient; its evolution is of some interest. In 1882 it contained 20 minims of the liquid extract with a drachm of the liquid extract of liquorice and chloroform water to the ounce. In 1901 the cascara was increased to 30 minims, the liquorice reduced to 30 minims, and 30 minims of syrup of ginger was added to prevent griping, and the chloroform water was reduced to half an ounce. In 1914 the cascara went up to a drachm, and instead of the ginger, 40 minims of sal volatile were added. Even this was not sufficiently potent and a compound cascara mixture was introduced and remains the popular aperient mixture:—

R Liquid extract of cascara .. minims 60
Liquid extract of senna .. minims 30
Liquid extract of liquorice .. minims 60
Tincture of hyoscyamus .. minims 30
Tincture of nux vomica .. minims 10
Emulsion of chloroform .. minims 10
Compound decoction of aloes to 1 oz.

As a prescription it savours of polypharmacy and can scarcely be called 'elegant', but it is reputed to be efficient with the torpid bowels of habitual constipation. Personally I doubt whether it is any more efficient than the pil. coloc. c hyose. of the B. P. which, if uncoated, maintains perennial popularity with the same class of patient and goes by the name of 'Uncle Henry'.

Astringents.—The hospital pharmacopœia no longer includes an astringent mixture which formerly was so necessary and popular that a large keg was kept on tap in the receiving-room. Motors have ousted horses, flies, contaminated food and summer diarrhœa. The old formula, however, is worth recording:—

R Aromatic sulphuric acid .. minims 15
Spirit of chloroform .. minims 20
Compound tincture of camphor minims 20
Decoction of logwood to the fluid ounce.

Aromatic sulphuric acid was the famous Mynsicht's elixir of vitriol of the seventeenth and eighteenth centuries, and sentimental regret for its disappearance from the B. P. is mingled with the feeling of satisfaction that it is no longer an important preparation.

Anti-dyspeptic formulae.—In the sixteenth and seventeenth centuries, and probably long before, the value of insoluble carbonates and phosphates in the treatment of dyspepsia was well known; chemistry could not then explain either the nature or the action of the drug, but the reputation of powdered unicorn's horn (narwhal's tooth), of calcined snail shells, of crabs' 'eyes' and crabs' 'claws' of the early pharmacopœias was evidently based on the relief of pain after food on their administration. Aqua Tofana, the favourite poison of the Borgias, seems to have been an acid solution of arsenic: if it was put into a cup made of 'unicorn's horn' effervescence occurred and the arsenic was thrown out of solution—small wonder that the

value of the rare narwhal's tooth was great in those days! Modern chemistry has brought to us other and more easily obtained insoluble carbonates, and we still use them to relieve gastric pain, which was then so often attributed to poison in the food. Until 1901 it was customary to prescribe the insoluble carbonates of bismuth and magnesium in combination with an emulsifying agent such as compound tragacanth powder; when this addition was found to be unnecessary the most popular prescription became the pulv. bismuthi co., of which the patient is told to take a teaspoonful stirred up in water. The composition is as follows:—

R/ Oxycarbonate of bismuth	..	10 parts
Heavy magnesium carbonate	..	25 parts
Sodium bicarbonate	..	25 parts

In the pulvis calcii carbonatis co., prepared chalk is substituted for the bicarbonate of soda. The acid and alkaline gentian mixtures are used extensively, but are so well known that comment is needless. The hospital formula for the gentian and rhubarb mixture is designed for economy:—

R/ Gentian	..	grains 5
Rhubarb	..	grains 5
Ginger	..	grain 1
Sodium bicarbonate	..	grains 10
Peppermint water to fl. oz.	..	½
Macerate for 24 hours and strain		

Such a prescription is satisfactory in a hospital where the medicine is compounded in large quantities, but is not suitable for private practice. A better though more expensive formula would be:—

R/ Tincture rhei compound	..	minims 30
Tincture zingiberis fortis	..	minims 5
Liquor ammonium dilutum	..	minims 10
Tincture gentian compound	..	minims 30
Aqua menthœ piperitœ ad	fl. oz.	½

A favourite prescription for the dyspepsia of chronic alcoholism is mist. capsici sedativa:—

R/ Potassium bromide	..	grains 10
Sodium bicarbonate	..	grains 10
Tincture of capsicum	..	minims 5
Strong tincture of ginger	..	minims 5
Infusion of quassia to fl. oz.	..	½

Fever mixture.—Simple diaphoretic mixtures are often of considerable value when the temperature is high. Mixture ammonium acetate compound is an example:—

R/ Spirit of nitrous ether	..	minims 30
Strong solution of ammonium acetate.	..	minims 30
Aromatic spirit of ammonia	..	minims 20
Chloroform water to fl. oz.	..	½

Cough mixtures.—In the dry stage of bronchial catarrh nauseating expectorants act by reflexly exciting the secretion; to secure this end the drug must be given in doses just short of producing the sensation of nausea. The ammonia and ipecac. mixture of the London Hospital contains 20 minims of the tincture of ipecac. with 3 grains of ammonium carbonate in some camphor water, and the dose of ipecac. is not found to be at all excessive. Acting in a somewhat similar manner is the standard cough mixture which is taken mixed with hot water:—

R/ Sodium chloride	..	grains 3
Sodium bicarbonate	..	grains 10
Emulsion of chloroform	..	minims 5
Oil of anise	..	minim 1/25
Water to fl. oz.	..	½

Seeing that aniseed water is no longer included in the B. P., 5 minims of the aqua anethi concentrata may be substituted for the oil of anise in private practice; moreover, it is often desirable to colour the medicine by adding some compound tincture of cardamoms.

In the more chronic forms of bronchitis the alkaline iodide mixture is of great value. Clinical experience supports the pharmacologist's view that large doses of potassium iodide are of less value than the small ones; the formula is:—

R/ Potassium iodide	..	grains 3
Ammonium carbonate	..	grains 3
Potassium bicarbonate	..	grains 10
Camphor water to fl. oz.	..	½

When the coughing reflex is weak it is often useful to add tincture nucis vomica to the mixture. When there is evidence of bronchial spasm, inhibition of the vagus is desirable; in such circumstances stramonium is often combined with potassium iodide. The mixture potassium iodide et stramonium contains the following:—

R/ Potassium iodide	..	grains 3
Tincture of stramonium	..	minims 10
Liquid extract of liquorice	..	minims 20
Chloroform water to fl. oz.	..	½

The dose of stramonium is small because some patients are readily affected by it; generally it is necessary to increase the dose until it causes some dryness of the mouth and then to make a slight reduction.

Sedative cough mixture.—The most commonly employed is Gee's linctus, of which the formula was borrowed from St. Bartholomew's Hospital—equal parts of paregoric, syrup of squill, and syrup of tolu—but a similar preparation is found in the old mixture scillæ compound:—

R/ Vinegar of squill	..	minims 15
Camphorated tincture of opium	..	minims 20
Emulsion of chloroform	..	minims 10
Infusion of gentian to fl. oz.	..	½

Blunderbuss prescriptions.—The old pathology which obtained for so many centuries held that disease was due to excess or defect of one or more of the four humours: blood, phlegm, black bile or yellow bile, and treatment was based on the hypothesis that the disturbance could be corrected by the administration of appropriate drugs—*contraria contrariis curantur*. Uncertainty as to the action of the drugs led to polypharmacy in the hope that if enough were given some would procure the desired result. The modern reversion to humoral pathology under the more attractive and 'scientific' title of endocrine imbalance seems to be associated with a like expectation. This is apparent not only in the proprietary mixtures of the wholesale druggists, but even in the hospital pharmacopœias.

The last edition of the London Hospital Pharmacopœia contains several examples of formulæ which can be justified only by the results of practical experience; at first sight it would seem to be undesirable to combine pharmacological and chemical incompatibles in the same prescription, for instance, in mixture ammonium carbonate compound:—

R/ Ammonium carbonate	..	grains 4
Tincture of squill (B. P. 1914)	..	minims 10.
Camphorated tincture of opium	..	minims 10
Syrup of tolu	..	drachm 1
Camphor water to fl. oz.	..	½

There is a stimulant and a sedative of the respiratory centre and an alkaline carbonate to interact with the benzoic acid of the paregoric. In the mixture oxymelis scillæ the pharmacologist might ask why the potassium iodide is introduced to increase the bronchial secretion and the opium to check expectation; the formula is:—

R/ Oxymel of squill	..	minims 15
Camphorated tincture of opium	..	minims 20
Potassium iodide	..	grains 2
Dextrose	..	grains 30
Chloroform water to fl. oz.	..	½

Practical experience may show that the pharmacologist's inquiry is indiscreet. Another ultra-modern prescription, seemingly designed as a panacea, but unlikely to captivate pharmacists, pharmacologists or the

older generation of physicians is the mixture *ferri alkalina*, of which the formula is:—

R Citrate of iron and ammonium	grains	20
Sodium bicarbonate	.. grains	15
Solution of arsenic	.. minims	3
Aromatic spirits of ammonia	minims	30
Tincture of nux vomica	.. minims	10
Infusion of calumba to fl. oz.	1	

Possibly because of its eponymous title, Broadbent's mixture retains a measure of popularity. The therapeutic intention is not easy to understand, but it demonstrates that a skilled pharmacist may circumvent chemical incompatibility for about 48 hours. It contains:—

R Ammoniated solution of quinine	fl. drachm	1
Strong solution of ammonium acetate.	minims	15
Camphorated tincture of opium	fl. drachm	1/2
Ammonium carbonate	.. grains	2
Tragacanth	.. grain	1/2
Peppermint water to fl. oz.	1	

In the present overcrowded state of the medical curriculum it is scarcely possible for the student to study intensively the subjects of pharmacy and materia medica. The British Pharmacopœia has become a book of standards. The newly-qualified practitioner needs help in the art of prescribing, and his own hospital pharmacopœia should provide that help; it should enable him to employ those medicines of which he has seen the effect when clerking in the wards. The conditions which govern dispensing in a hospital are, however, different from those which obtain in private practice, and consequently while approving the large majority of the formulæ given in our pharmacopœia, I have pointed out some which might lead to disappointment if prescribed outside the walls of the institution. Perhaps when the promised reform of the medical curriculum is effected, greater stress will be laid upon the training in materia medica and pharmacy, and they will be studied at a period more appropriate than at present. Surely the craftsman should know his tools and how to use them with economy and skill.

Anterior Pituitary and Anterior Pituitary-like Substances: Therapeutic Applications

By EMIL NOVAK, M.D.

(From the *Journal of the American Medical Association*, Vol. CIV, 23rd March, 1935, p. 998)

Up to a few years ago, efforts at anterior pituitary therapy were limited to the use of oral or hypodermic preparations, either of the anterior lobe alone or of the whole gland, in conditions of supposed deficiency, such as adiposogenital dystrophy, pituitary obesity or amenorrhœa, dwarfism or infantilism. In this respect the common practice was almost analogous to the early methods of ovarian therapy in conditions of supposed ovarian hypofunction. Just as the clear differentiation of the ovarian hormones has completely changed the complexion of ovarian therapy, so have the recent advances in anterior pituitary hormonology changed the points of view and methods in pituitary organotherapy. The tendency now is to aim at hormone therapy rather than at mere gland treatment.

The important physiologic advances to which reference has been made have been fully reviewed in previous articles of this series. The present paper, like the one on oestrogenic therapy, makes no pretense of being an exhaustive review, being offered rather as a brief summary and appraisal of the present status of the subject, and including only a minimum of references to the extensive and somewhat bewildering literature.

As a basis for the discussion of the therapy of the anterior lobe, the following hormones have been enumerated as having their source in this structure:

1. The growth hormone, commonly accepted as being the product of the eosinophilic cells.

2. The gonadotropic hormone or hormones; generally believed to be formed by the basophilic cells.

3. The lactogenic hormone, shown by Riddle to be the cause of lactation, but only when the mammary gland is previously subjected to the action of the oestrogenic hormones.

4. The thyrotropic hormones on which the activity of the thyroid is dependent.

5. The fat metabolism hormone.

6. The blood sugar raising hormone.

7. The adrenotropic hormone.

Of all these, only the first two would seem, in the present state of knowledge, to merit any discussion from the standpoint of organotherapy. The lactogenic hormone (prolactin) may perhaps prove of clinical value as a galactagogue, but only one brief report, based on a very small series of cases, has so far been made on this subject. Encouraging results are said to have been obtained.

CLINICAL CONDITIONS INVOLVING GROWTH HORMONE

Growth abnormalities.—The best known of these, gigantism and acromegaly, are due to excessive production of the growth hormone, most often by adenomas of the acidophilic cells. Here the problem is not one of organotherapy but of correcting the endocrine excess by means of surgery or irradiation.

As types of deficiency of the growth hormone may be mentioned the growth deficiencies characterizing the various types of pituitary dwarfism and infantilism, especially the so-called Lorain-Levi and Brissaud types. While these are believed most often to be due to adenomas of the chromophobe cells, the obvious growth deficiency would seem to justify the use of preparations containing the growth hormone. Simmonds' disease (cachexia hypophyseopriva), a rare disorder due to destructive disease of the entire anterior lobe, and characterized by emaciation, a prematurely senile appearance, amenorrhœa and other symptoms, has in a few cases been treated by anterior pituitary preparations, either orally or hypodermically, but the results have not been striking.

Preparations available.—No commercial preparation of the growth hormone has as yet been recognized by the Council on Pharmacy and Chemistry of the American Medical Association, which is not surprising in view of the present inability of manufacturers to prepare it in pure forms, and the meagreness and unconvincingness of clinical reports. In this country only three commercial preparations, so far as I know, are available; viz, the 'Antuitrin G' of Parke, Davis & Co., the 'Phyone' of the Wilb Laboratories and Anterior Pituitary Extract Squibb. These extracts all contain other active principles of the anterior pituitary in addition to the growth-promoting factor. The more purified form of the growth hormone with which Evans has achieved such striking results in animals is not yet available commercially, although the manufacturers to whom it has been entrusted have been able to furnish small amounts for a few clinical and experimental studies. Engelbach in 1930 reported satisfactory growth results in a pituitary dwarf of 9 years in whom treatment with the Evans' purified growth hormone was carried out, with daily injections of the substance, for nine and a half years, 2.7 inches (7 cm.) in height being gained during this period. Engelbach and Schaefer have recently reported encouraging results in seven cases of dwarfism. In these the growth hormone preparation (antuitrin G) was combined with thyroid, which Smith has shown to increase the effect on skeletal growth. Both Evans and Reichert emphasize the importance of having such growth hormone extracts free of gonadotropic principles, which might result in excitation of sex maturity, with epiphyseal closure and the cessation of growth.

There are a few clinical reports by Cushing and others of the use of preparations of the growth hormone in cases of pituitary growth deficiency, but, on the whole, the results have not been impressive. The chief hope for the future seems to lie in the preparation

armamentarium. At times the results seem brilliant, in other cases only improvement without disappearance of the pain is reported by the patient, and in still others the results are disappointing. However, in the treatment of a disorder in which there is so much therapeutic floundering as in that of primary dysmenorrhœa, the plan suggested is worthy of trial, especially as it is far more rational than most others which have been suggested. It should again be emphasized, however, that in all cases of this group there should be a comprehensive survey of the constitutional, pelvic, psychic and even sociologic status of the patient.

In 1933 Brosius and Schaefer reported a case of complete aspermia in which the intramuscular injection of antuitrin S (2 c.e. twice a week) was followed by spermatogenesis, so that at the end of nine weeks numerous motile spermatozoa were found in the semen, while the testes showed a definite increase in size. Needless to say, this observation, interesting as it is, needs confirmation through trial in a large number of cases. In two recent cases of sterility in my practice in which the responsible factor was the husband's aspermia, the method suggested here failed to produce spermatogenesis.

In 1931 Bengtson reported striking results in sixteen cases of alopecia treated by anterior pituitary substance. He recommended the hypodermic use of a pituitary gland preparation as preferable to the oral route, although the combination of the two methods gave the most rapid response. While he considered that all these cases belong to the category of glandular alopecias, he suggested that possibly other common types of baldness might also respond to the treatment. In spite of the author's own conservatism in this regard, the paper was taken up rather sensationally by the daily press. There has been no confirmation of his observations, and Lord and others have reported unsuccessful results from the method. There seems to be no reason to expect benefit from it except perhaps in cases of genuine hypopituitarism in which the alopecia is a part of the general picture. Even here the usual limitations and uncertainties of pituitary therapy would prevail.

SUMMARY

The employment of the growth hormone preparations is indicated in the various types of pituitary growth deficiency. The results are usually not striking and will probably not be improved until biochemists isolate the hormone and produce more potent preparations.

The anterior pituitary-like preparations are probably of no value when used alone in the treatment of amenorrhœa, and even when combined with œstrogenic substance the results are very little improved.

The anterior pituitary-like preparations made from pregnancy urine have appeared to give excellent results in many, though not by any means all, cases of functional uterine bleeding, so that, when this disorder is encountered in young women, in whom radiotherapy is undesirable, the method should certainly be tried.

The comparatively small group of cases thus far reported in which undescended testis has been successfully treated by the anterior pituitary-like preparations make this method seem promising and worthy of more extended trial, especially as the surgical treatment of this condition is not as satisfactory as might be wished.

There is no objection to a trial of the anterior pituitary-like preparations in the occasional mysterious and baffling cases of habitual abortion, although the results are not much more clearly defined than is the ætiology of the condition.

These preparations appear rational as adjuvants in the treatment of primary dysmenorrhœa, although correction of constitutional and psychic factors is often much more important, and should never be overlooked.

As to other conditions, such as aspermia and baldness, the clinical data thus far available are much too meagre to draw conclusions as to the results of treatment with the anterior pituitary-like preparations, and

there are physiologic reasons to make one question the value of this plan.

It is possible that the results of organotherapy in various forms of anterior hypopituitarism may be improved with preparations of the gonad-stimulating hormones obtained from the anterior lobe itself.

The Treatment of Whooping-Cough

By W. T. BENSON, M.D., F.R.C.P. (Ed.), D.P.H.

(From the *British Medical Journal*, Vol. I, 30th March, 1935, p. 657)

WHEN an infant or young child who has not previously suffered from whooping-cough develops a persistent, troublesome cough with scanty clinical signs of bronchitis, and if within two or three days the cough, which is worse at night, tends to occur in paroxysms giving rise to suffusion or blueness of the face and occasionally terminates by a vomit, suspect infection with *H. pertussis*. If in such a case there is a history of recent intimate contact with whooping-cough then the clinical diagnosis can be made with some confidence during the catarrhal stage. Failing a history of exposure to infection the diagnosis may be aided by examination of the blood picture or confirmed by the isolation of the Bordet-Gengou bacillus.

The presence of a leucocytosis (commonly 15,000 to 25,000 white cells per c.mm.) with a well-marked relative lymphocytosis (from 50 to 70 per cent of lymphocytes) is highly suggestive of whooping-cough. For bacteriological diagnosis two Petri dishes containing a special culture medium for *H. pertussis* will have to be obtained from a laboratory. Instruct the parent or nurse to expose the surface of this medium five inches in front of the patient's mouth for fifteen seconds during a natural paroxysm of coughing. Expose the second dish in a similar manner. Should the patient's cough be mainly short, sharp, and occasional, then expose each dish on four occasions. Return the dishes to the laboratory as soon as possible. Should examination of the cough plate after seventy-two hours' incubation show colonies of *H. pertussis* then a diagnosis of whooping-cough may be confidently made. The causal organism can apparently be isolated from approximately 75 per cent of cases during the catarrhal stage of the disease. It is to be noted that a negative report does not exclude the possibility of whooping-cough.

It must be remembered that in infants and in adults the typical whoop may not appear throughout the whole course of the illness; bacteriological aid would simplify the diagnosis of such cases.

GENERAL TREATMENT

Most clinicians with an extensive experience of whooping-cough are of the opinion that when the primary essentials of medical care have been arranged for the patient we have practically exhausted our effective therapeutic armament. Vaccines, drugs, and ray therapy may be regarded as adjuvants to be given a trial when special indications arise.

When whooping-cough is suspected the patient should be confined to bed and strictly isolated from other members of the family who have not already suffered from the disease. Isolation should be enforced for a period of five weeks dating from the onset of symptoms. The bedroom, with a sunny exposure for choice, should be kept freely ventilated, but at an equable temperature around 60° to 65°F. If the weather is warm and sunny the bed may be placed at the widely open window during the day; otherwise the patient should be screened from draughts. The bedclothes should be light yet warm, and the child clothed in a flannel nightgown. A flannel binder firmly applied round the abdomen is of supportive value during the strain of coughing. Some trustworthy individual should be constantly in attendance to support and to comfort the child during the paroxysms of coughing and to have a receptacle ready for the vomit.

Providing the attack is afebrile, uncomplicated, and not unduly severe, the child may be allowed out of bed about the third day of the whoop. When the paroxysms exceed thirty in the twenty-four hours, or when there is a previous history of chest trouble, confinement to bed until convalescence is well established is advisable. If the weather is equable and sunny the patient should spend most of his time in the open air—precautions being taken to avoid contact with susceptible children. The clothing should be warm but not excessive, and mild exercise should be encouraged. The bowels should be regulated by occasional doses of syrup of figs or liquorice powder.

IMPORTANCE OF DIET

The dietetic management of a case of whooping-cough is of the utmost importance. In severe attacks, particularly if improperly handled, the persistent vomiting results in a serious degree of malnutrition. The secret of feeding is to give small amounts at frequent intervals. Large meals should be avoided, and food administered preferably about ten minutes after a paroxysm. For babies 'feeding by the clock' may have to be adjusted to the necessities of the case. If vomiting and loss of weight continue then the interval between feeds should be decreased and the bulk of each feed lessened. Various modifications of the diet may be necessary. The milk may be diluted, boiled and citrated, or peptonized; whey and albumen water may have to be temporarily resorted to. In the worst cases mouth feeding may require to be supplemented by rectal or intravenous saline to which 5 to 10 per cent of glucose has been added. Lavage of the stomach twice daily with 0.6 per cent solution of sodium bicarbonate is a useful measure when vomiting is frequent.

no meals must be avoided, but a diet is necessary. Milk, eggs, butter, fish, chicken, meat, and vegetable soups are better than an excess of potato, bread, milk puddings, jams, and similar starchy or saccharine foods. Biscuits, rusks, oatcakes, or other dry crumbly foods should be avoided. Fresh orange juice drinks sweetened with 5 to 10 per cent of glucose may be freely administered. A prolonged convalescence, with if possible a change of air, is advisable.

VACCINE AND SERUM THERAPY

Very conflicting reports have been published regarding the value of vaccine treatment. It is generally agreed that no improvement can be expected to follow vaccine therapy unless the initial injections have been given during the catarrhal stage of the disease. A vaccine containing *H. pertussis* alone, or preferably, a mixed vaccine containing in addition *H. influenzae* and the pneumococcus, may be employed. Six subcutaneous injections rising from 100 million to 1,000 million Bordet-Gengou bacilli should be administered on alternate days. This method of treatment has been given a prolonged trial in the wards of the Edinburgh City Hospital, but the results have proved disappointing.

Human convalescent whooping-cough serum or whole blood injected intramuscularly on one or more successive days in doses of 10 to 20 c.cm. has been reported on favourably by various French physicians. If circumstances permit this specific method of treatment might be tried in severe attacks in infants.

DRUGS

In spite of the numerous drugs that have been recommended for the treatment of whooping-cough the writer after an extensive experience of many preparations—including belladonna, antipyrine, bromoform, benzyl benzoate, ether, adrenaline, and ephedrine—is of the opinion that none can be looked upon as a specific.

In a mild attack there is no need for medication. If desired a simple expectorant mixture may be administered three daily:

R Tinct. camph. co.	..	..	mp iv.
Vin. ipecac.	..	..	mp iii.
Syrup. scillae	..	..	mp x.
Aq.	..	..	q.s.

When the paroxysms are frequent and severe, resulting in considerable exhaustion and loss of sleep, a sedative or ing should be prescribed. One or other sedatives may be prescribed four-hourly: syrup of codeine phosphate, 10 minims; Dover's powder, 1/2 grain; chloral hydrate 2 grains, with ing should be prescribed. If necessary the dose may be increased until either improvement ensues or the child becomes drowsy. ing should be prescribed. Doses of 1/6 grain to 1/4 grain occasionally results in a rapid ing should be prescribed. Because of its toxicity this drug should be employed with discretion. Belladonna is probably the most popular drug in the treatment of whooping-cough: in the dosage commonly prescribed it is quite ineffective. In an endeavour to control the paroxysms belladonna must be pushed to the physiological limit. Commence with three drops of the tincture three times daily; then, providing no idiosyncrasy is present, promptly change to four-hourly administration, followed by a daily increase of one drop per dose until dilatation of the pupils, flushing of the cheeks, and dryness of the mouth indicate that the limit of safety has been reached. During convalescence the patient should take cod-liver oil and malt with some preparation of iron; the syrup of the iodide of iron is excellent.

ULTRA-VIOLET RAY AND X-RAY TREATMENT

Whilst of value as a general tonic during convalescence, particularly in the winter months, ultra-violet light therapy has no specific effect on the paroxysmal stage of the disease. In the absence of pulmonary complications a daily general treatment ing should be prescribed. to both back and front may be tried. This a minute daily care.

Although some beneficial results from x-ray treatment in 75 to 80 per cent of cases, due apparently to a reduction in size of the bronchial lymph glands, other investigators have not been so successful.

COMPLICATIONS

The most important complications of whooping-cough are bronchopneumonia, convulsions, and gastro-enteritis. These complications are most apt to occur in young children, in whom they are a frequent cause of death. Bronchopneumonia usually develops at the height of the paroxysmal stage, and seems to predispose to convulsions. Gastro-enteritis is manifested by frequent profuse diarrhoea in the intervals.

seen but are not of serious importance. is not uncommon. Many forms of paralysis and convulsions.

PROPHYLACTIC MEASURES

Whooping-cough is most highly infectious during the early stages of the disease. It is therefore essential to prevent young children, in particular, from being needlessly exposed to infection with *H. pertussis*. Practically all the deaths from whooping-cough occur during the first three years of life.

Prophylactic vaccination is of value not so much in preventing the development of the disease as in modifying the severity of the subsequent attack. Subcutaneous injections of 8,000 million Bordet-Gengou

alternate days to contacts who have not previously suffered from whooping-cough. The injection of serum or of whole blood of a whooping-cough convalescent or of those who have had whooping-cough at some time in their life has been reported as resulting in complete or partial protection in a large proportion of cases.

For children under 3 years of age 5 c.cm. of serum or 20 c.cm. of whole blood should be injected intramuscularly.

In spite of the multiplicity of remedies recommended in the treatment of whooping-cough an effective therapeutic agent has yet to be found.

Reviews

GYNÆCOLOGY.—By Brooke M. Anspach, M.D. Fifth Edition. 1934. J. B. Lippincott Company, Philadelphia and London. Pp. xii plus 832, with 679 illustrations of which 10 are in colour. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 31-8

THE fifth edition of Anspach's *Gynæcology* is a worthy successor of the previous issues. The first edition appeared only twelve years ago; this is a testimony of the popularity of the work. The chapters on physiology, disturbance of function and treatment by radiation are largely new. The views therein are reliable and up to date. The chapters on diseases of the external genitalia, endometriosis, ovarian tumours, amenorrhœa, uterine bleeding, sterility and dysmenorrhœa have been re-written and modernized.

We think that a great improvement would be effected in future editions if operative gynæcology were dealt with in a separate part of the volume and in a more detailed manner. The performance of a total hysterectomy by the abdominal route—Wertheim's hysterectomy is not being criticized—is described only in a few lines in the present edition. The operation of implantation of the ureters into the rectum is not described at all in the text but appears in two illustrations. We are compelled to point out that it is not in accordance with modern pathology to carry out the removal of any ovarian tumour by 'evacuation of the contents of the largest cyst by means of a trocar, delivery of the collapsed cyst through the incision and ligation of the pedicle'. We do not concur in the recommendation of Watkin's interposition operation and are in complete agreement with the views of another eminent American gynæcologist—Graves—on its numerous disadvantages.

Apart from operative gynæcology, the work is concise, modern and one of well-balanced views. There are one or two statements, however, which we consider unusual; e.g., that non-operative treatment of retroversion is to be preferred during the child-bearing age; that the introduction of a pessary after pregnancy has started in a retroverted uterus is likely to cause abortion. These, however, are minor details and do not detract from the general excellence of the non-operative part of the volume which we can recommend to all interested in the subject. The printing is very good and the illustrations clear and copious.

S. A. McS.

SYNOPSIS OF OBSTETRICS AND GYNÆCOLOGY.—By A. W. Bourne, M.A., M.B., B.Ch. (Camb.), F.R.C.S. (Eng.). Sixth Edition, fully revised. 1935. John Wright and Sons Limited, Bristol. Pp. vii plus 444. Illustrated with numerous diagrams. Price, 15s.

THE recently published synopsis presents the facts concerning obstetrics and gynæcology in the concentrated space of 450 pages. The first half deals with obstetrics, the second with gynæcology.

Both sections have been completely revised and new additions are the sections on obstetric shock and sex hormones.

The author has based his work on well-known textbooks and has enunciated current views with a clarity that is remarkable in a book of this size. A large number of small-sized diagrams are a valuable addition

to a work that has definite value firstly to students preparing for examinations and secondly to practitioners as a means for ready reference.

The author has always wisely insisted that his book must not be regarded as a textbook and students would do well to follow his instructions.

The type though clear is small, and one looks forward to the time when synopses in general are printed in type that will reduce ocular stress to a minimum.

S. N. H.

HYGIENE FOR NURSES.—By J. Guy, M.D., D.P.H. (Camb.), F.R.F.P. & S. (Glas.), F.R.C.P. (Edin.), and G. J. I. Linklater, O.B.E., M.D., D.P.H., D.T.M. & H., M.R.C.P. (Edin.). Third Edition. 1935. E. and S. Livingstone, Edinburgh. Pp. xi plus 212. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 3-12

It is a testimony alike to the usefulness of the book and to the increasing contacts between curative and preventive nursing that a third edition of *Hygiene for Nurses* by Guy and Linklater has been called for less than two years after the publication of the second edition.

The arrangement of the book into personal, communal and social hygiene on the one hand and environmental hygiene on the other is unchanged and the emphasis remains on the former. One or two useful additions on the hygiene of menstruation and the menopause have been made and the chapter on heating has been largely re-written.

The book offers the nurse an excellent introduction to the wider aspects of her duties. Her immediate responsibility is the restoration of her patient to health but if the restored health is to be maintained a new way of life and improved physical surroundings may be necessary, and in teaching this the nurse's responsibilities are heavy and her opportunities many. She will find much help in *Hygiene for Nurses*. A little more space devoted to mental hygiene would perhaps add to the value of an already useful book. The recommendation given to the second edition may be safely repeated for the third.

J. M. O.

MEDICAL CASE-TAKING AND DIAGNOSIS.—By A. J. Kohliyar, B.A. (Bom.), M.D. (Lond.), M.R.C.P. (Lond.). 1935. The Medical Bulletin, Empire Automobile Building, Queen's Road, Bombay. Pp. 133. Price, Rs. 3

THE contents of this book appeared as a series of articles in *The Medical Bulletin*. They are now published in book form, primarily for teaching students on their first joining the hospital. It includes in small compass the kind of information which may be helpful, as a supplement to larger books. A beginner will find it useful in helping him to follow his tutor in clinical medicine. The book consists of fourteen small chapters of which six are devoted to the nervous system (pages 79 to 114). The arrangement is not very satisfactory. On page 3 the author suddenly describes Kernig's sign and Brudzinski's signs while interrogating a patient under 'history and general inspection'. The 'lymphatic system' and 'joints' have been included in the chapter (XIII) on 'urinary system'. Chapter VI

deals with the 'acute abdomen' which really falls within the province of a surgeon. Short theoretical discourses, viz, on aetiology of cardiovascular disease, uræmia, etc., are not appropriate to a booklet of this type, while detailed practical notes on cardiac-efficiency tests, kidney function tests, character of sputum, etc., would have made it more useful.

R. N. C.

INSOMNIA AND OTHER DISTURBANCES OF SLEEP.

—By E. Miller, M.A. (Cantab.), M.R.C.S., L.R.C.P., D.P.M. (Cantab.). 1935. John Bale, Sons and Danielsson, Limited, London. Pp. 53. Illustrated. Price, 2s. 6d.

THIS small book of the 'pocket monograph' series contains a mass of information on the subject of sleeplessness and allied subjects. At the same time the author has not the power of clear expression, and he also does not confine himself strictly to his subject so that there is much extraneous matter included. Psycho-analysis and psycho-pathology take a large place in the book, but without more explanation than there is room for in a book of this size a great deal of this information will not be of much value to any but the skilled psychiatrist. It is hardly a book for the student, and although there is much to be learnt from it the extraction of useful information is not as simple as one usually expects from a miniature volume of this type.

'BODY MECHANICS' IN THE STUDY AND TREATMENT OF DISEASE.

—By Joel E. Goldthwait, M.D., LL.D., Lloyd T. Brown, M.D., Loring T. Swalm, M.D., and John G. Kuhus, M.D. 1934. J. B. Lippincott Company, Philadelphia and London. Pp. xiv plus 281, with 99 illustrations. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 13-8

THIS subject, body mechanics in relation to disease, has at last come into its own, and the medical student of to-day receives in many medical schools, teaching in this important branch of medical science.

The work of the senior author of this book has already received the recognition it deserves. It has been well reviewed in Ogilvie's *Recent Advances in Surgery*, and 'Goldthwait's types' are well known to those surgeons who are interested in the mechanics of the body.

In this book, *Body Mechanics*, there are many excellent charts showing good and faulty postures. These charts are elaborated by diagrams, actual photographs, and skiagrams showing the resultant body sag, and damage done to joints and viscera by poor body position.

The authors show how a large proportion of eye strain can be caused by the forward thrust of the head and neck, which is the result of an exaggeration of the normal curves of the spine due to faulty stance.

They show also how the low position of the diaphragm (again the result of bad body mechanics), by creating a drag on the thoracic viscera, and pressure on the abdominal viscera, can be a large contributory factor in the production of pathological conditions in the chest and abdomen.

The book is good all through, but especially those chapters which deal with backache, arthritis of the spine and joints of the limbs.

Whether however, there will be general agreement that peritoneal bands and kinks, or such conditions as appendicitis and carcinoma of the uterus can be, as suggested by the authors, due to bad body mechanics, is a matter for conjecture.

The treatment advocated consists of graduated exercises designed to overcome faulty posture, and it is claimed that once this has been accomplished, the patient, even if not perfectly cured, will be greatly benefited. The treatment however is very prolonged, for it is suggested that it should hardly ever be less than of one year's duration and in the more chronic cases it may last as long as five years.

The physical culture methods of the drill sergeant of older days have been replaced by new and better ones, and this little book is concerned with these later methods. Medical men and teachers of modern physical exercises, especially those who have the care and instruction of the youth of the present day, would do well to read this book carefully, for prevention is better than cure.

H. E. M.

X-RAY INTERPRETATION.—By H. C. H. Bull, M.A., M.B., M.R.C.P. 1935. Oxford University Press, London. Pp. xxxiv plus 382, with 280 illustrations. Price, 21s.

THE author provides no prefacial apologism for the writing of another book on so familiar a subject. Such apologies containing, as they usually do, references to the 'demand' of an imaginary public are distressingly common and yet they must fail to convince all but a very small minority of readers. The book itself should provide its own justification, as in this case it does—most definitely. Another distinctly unusual feature is the complete absence of all plates or illustrations, other than line drawings.

This has its disadvantages, as the reader who sets forth into the world to read skiagrams with only the knowledge and visual pictures that he has acquired from this book will find himself entirely lost: however, to use a medical book to replace practical experience is to abuse it. On the other hand the presentation of a line drawing ensures that the reader will know what he is expected to see in a skiagram and, if at first he finds considerable disparity between the line drawing, the skiagram, or the fluorescent screen, as his experience advances this disparity will be lessened.

The book is written for the clinician, and as the title indicates it is mainly concerned with interpretation of the picture presented on the fluorescent screen and of the skiagrams, yet there is a certain amount of the technique of radiography introduced, but only in so far as it concerns the patient, that is to say there is no reference to the x-ray plant, tubes, length of exposures, etc., but there are full details regarding the preparation of the patient, the giving of the opaque meals, the posture of the patient and the angle with reference to the screen, etc.

It is difficult to pick out any chapters for special mention, but those on the visualization of the intestinal canal are particularly good; in these a great deal of attention has been given to the subject of normal variations and these associations with persons of different habits.

We can find little to criticize in the book itself and in the excellent way the subject has been presented, but we have one criticism with regard to grammar—the use of 'due to' as if it were an adverb and not a participle, e.g., in the last line of p. 173. This is so common a mistake that in a few years it will have to be accepted as a 'common usage', but we look to publishers like the Oxford University Press to save us from a too rapid change in our language.

It is in every way an excellent book that we can thoroughly recommend to practitioners and students.

INTERNATIONAL CLINICS. VOLUME IV. FORTY-FOURTH SERIES, 1934.—Edited by L. Hamman, M.D. J. B. Lippincott Company, Philadelphia and London. Pp. viii plus 326. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited. Price, Rs. 37-8 per set of four volumes

As is usual, this quarterly publication provides a number of interesting papers on a variety of medical subjects. The paper on vitamin B and vitamin-B deficiencies provides an excellent summary of the present-day knowledge regarding beri-beri, pellagra and the less important B-avitaminoses. The case for and against the B-vitaminosis being the sole cause of beri-beri is well presented and the author obviously veers

towards the middle course, taking the view that deficiencies of vitamin B play an important part in bringing about the syndrome, but that probably there are other factors concerned. One is a little surprised to find no reference whatsoever to epidemic dropsy. It is of course geographically a very localized condition, and its aetiology is uncertain, but a discussion on this condition so closely associated to 'wet' beri-beri would have been very appropriate; perhaps the writer felt that he had insufficient data and in this the Indian workers are somewhat to blame, as, though there has been much discussion on this disease, little epidemiological or even clinical data have been published.

In the paper on the treatment of allergic asthma by desensitization, the writer draws attention to the many factors that influence prognosis in this condition. Perhaps the most important is the inheritance factor; if the patient has a definite family history of hypersensitiveness, the prospects of complete cure are much reduced. Whilst admitting the necessity for treating concomitant infections of the upper and lower respiratory tracts, he points out that these local conditions are often secondary to, and not the predisposing causes of, asthma.

Finally, he points out that by desensitizing the patient you are not getting at the root cause; his cells are still hypersensitive, although they may be desensitized to one irritant, or even a group of irritants; furthermore desensitization is never complete.

There are a number of other articles of considerable interest, including a well-illustrated one on cancer of the cervix uteri, one on the modern concept of sterility, and a good review on progress in dermatology.

L. E. N.

ILLUSTRATIVE ELECTROCARDIOGRAPHY.—By Joseph H. Balnton, A.B., M.D., and J. Burstein, A.B., M.D. 1935. D. Appleton-Century Company, London. Pp. xvi plus 258. Price, 21s.

A NUMBER of very useful books on electrocardiography have been published during the last few years, and even in this company the book under review holds its own. With the exception of a few explanatory pages in general principles, the book consists of 100 plates, each showing from one to half a dozen electrocardiograms with explanatory captions.

The student is taken step by step through the fundamentals of the subject—e.g., the first plate and its corresponding captions explain the method of measuring time and voltage, the 2nd, 3rd and 4th introduce the reader to the waves P, QRS and T, one by one, the 5th and 6th show methods of standardization, the 7th axis deviation, the 8th and 9th variations due to body posture, and the 10th to 14th normal variations—before he is allowed to study the effect of disease on the electrocardiogram. The next 56 plates illustrate clear-cut pathological conditions; these have been grouped into 8 chapters. There is a chapter on multiple abnormalities and one on miscellaneous conditions—such as dextrocardial and congenital heart defects, and a final—very useful chapter on artefacts on the electrocardiogram.

The arrangement of the book is entirely satisfactory as in very few instances is it necessary to turn over a page to consult an illustration referred to in the text and, as the illustrations are all produced upright, the irritation of having continually to turn the book through an angle of 90 degrees is obviated. The oblong shape of the book makes it unsuitable for the average bookshelf—but one cannot have it both ways.

We can recommend this book, alike to the student who is entirely unfamiliar with the subject and has to learn the interpretations of electrocardiograms *de novo*, to the practitioner who has forgotten much that he was taught about the subject as a student, and to the consultant as a book of reference.

PRACTICAL TALKS ON HEART DISEASE.—By G. L. Carlisle, M.D. 1934. Baillière, Tindall and Cox, London. Pp. x plus 153

THIS is a well written book on heart disease as it is encountered in general practice. It is far more suitable for the general practitioner than for the student in the sense that it is not a complete treatise on the subject and that much is left out. For example, the subject of prognosis is really scarcely considered. Dr. Carlisle talks of patients 'living for some years'; obviously in some instances he means that with luck the patient may survive three or four years, whereas in others he means that the patient's expectation of life is only slightly reduced—two very different things. On the other hand every third-year medical student will gain much from reading the first few chapters on methods of examination in heart cases.

The author's principle is that fingers and eyes were made before x-rays and electrocardiographs, and that they should be used exhaustively before any instruments are brought into action; he considers that even the stethoscope is relied upon too much. This attitude is a very suitable corrective to the modern tendency to rely too much on complicated instruments. Particularly so as the advice comes from a university in America where this tendency is even more pronounced than in Europe.

However, some cardiologists will think the writer has gone too far, especially in his belittlement of the stethoscope. Another way in which he seems to have laid himself open to criticism is in his attitude towards exercises during the examination of a patient; he seems to think that they are a waste of time.

The author's style is good but occasionally he has failed to resist the introduction of a trite Americanism. On the whole we consider it a very useful book, and one that every general practitioner will be the wiser for reading.

THE ESSENTIALS OF MATERIA MEDICA, PHARMACOLOGY AND THERAPEUTICS.—By R. H. Micks, M.D. (Dub.), F.R.C.P.I. 1935. J. and A. Churchill Limited, London. Pp. xii plus 395. Price, 12s. 6d.

THIS book is written by a professor of pharmacology who in the preface says he has no personal experience of experimental pharmacology. This lack of experience, however, does not appear obvious in the book for the author has produced an eminently practical little volume. It appears to be arranged on the basis of a course of lectures and this method will be found very useful for purposes of reference as can be seen from the titles of a few of the chapters, taken at random. I. Opium and morphine. General principles; XI. Drugs concerned in the treatment of anæmia. Iron. Liver. Desiccated stomach; XXV. Anthelmintics; and XXIX. Urinary antiseptics.

The author says he has limited the scope of the book to such drugs as are administered internally and are of real value in therapeutics. We presume he does not mean by this that the pharmacopœia should be limited to his selection, but that he has made a careful selection of the drugs that will supply the need of the average practitioner, and in this we agree he has been remarkably successful though we noted one or two omissions with which we are not in agreement (tetrachlorethylene for hookworm infection, for instance).

There is a summary at the end of each chapter which gives the reader an opportunity of rapidly finding out the main points discussed in it. As the author recommends the summary to be read first one cannot see why it was not put at the beginning of the chapter, perhaps the fact that the book was written in Dublin explains this.

In the reviewer's opinion it is a book that can be recommended especially to students for they will find in it all that they need to equip them for the art of prescribing, not the least useful chapter being the last, which is devoted to prescription-writing and which contains a delightfully frank but very true paragraph on

placebos and the necessity for prescribing them in general practice.

THE JOURNAL OF TECHNICAL METHODS AND BULLETIN OF THE INTERNATIONAL ASSOCIATION OF MEDICAL MUSEUMS, No. XIV.—Edited by M. E. Abbott, M.D. 1935. Published annually from The Medical Museum, McGill University, Montreal. Pp. 134. Illustrated. Price, \$2.00 per copy

To those who work in connection with medical museums, and who are interested in the collection and preservation of pathological specimens, this journal with all the useful information contained therein is invaluable. It comprises all the most recent and tested methods and museum techniques and contains also valuable articles from skilled technicians and specialists on the subject.

The present volume begins with an obituary note and a frontispiece portrait of Dr. William Henry Welch, the renowned pathologist and a remarkable personality in John Hopkins Hospital.

The editorials cover a wide range of subjects. Of the original publications, the article written by W. Boyd on the idea of a clinical pathological museum is of particular interest to those who are teachers of pathology and medicine. The possibilities of such a museum is unlimited and it may be made the centre of teaching in a medical school. The underlying idea is to illustrate in graphic form, for the students, the principle of the correlation of the gross and microscopic lesions with the clinical findings and x-ray picture. The original history and autopsy notes are also placed at the top of a specimen to complete the references. The author has illustrated his method with photographs of the museum of Winnipeg to make the display more attractive and at the same time instructive. Portraits of masters of pathology, and coloured drawings relating to particular diseases, etc., are placed in appropriate places throughout the museum. The seats have been made more comfortable so that the students are attracted to spend longer hours in the museum for solid study, without being fatigued. The next article deals with the method of teaching morbid anatomy to students at autopsy. The most useful part, as pointed out by the authors, in autopsy instruction is a review of the various reports and findings on the case, which is held the next week. An illustrative article on the Osler pathological collection in the medical historical museum of McGill University is written by M. E. Abbott, curator of the museum. No one can read the work and writings of Sir William Osler without a feeling of great respect and admiration for that great physician, his clear descriptive style, accurate observations and his insight into the ætiology of disease. The rich and monumental collections of autopsy materials display his genius.

The next section deals with various improved museum techniques. The method of mounting flat specimens in frames in the tropics, described in detail by Tull, will be found very useful specially for those who have scarcity of materials. In another article the advantages of lighting display for museum specimens have been shown. Preparation of bone specimens by Wagoner and Nuckols is an exhaustive monograph on the subject. Improved technical methods have been adopted for ensuring the durability of the specimens and also for teaching students. Artistic methods for labelling museum specimens have also been described.

The next section deals with photographic methods and gives details of technique for infra-red photography.

The microscopical technique for the identification of amœbæ in tissues is an improvement on previous methods. Then there are several case reports of cardiac and vascular anomalies. In addition to all these valuable articles, a few pages have been devoted to abstracts of current medical literature on museum administration and museum technique. One who desires to have

up-to-date information on museum work cannot do without this journal.

M. N. D.

ONCHOCERCIASIS WITH SPECIAL REFERENCE TO THE CENTRAL AMERICAN FORM OF THE DISEASE. PARTS I, II, III AND IV.—By R. P. Strong, Ph.B., M.D., S.D., J. H. Sandground, D.Sc., J. C. Bequaert, Ph.D., and M. M. Ochoa, M.D. 1934. Harvard University Press, Cambridge. Pp. xlv plus 234. Illustrated

THIS is a book in four separate parts each contributed by a different author.

Part I by Richard P. Strong is an exhaustive account of onchocerciasis disease in Guatemala from every point of view. This is the only part of the world where this disease is of real importance to human beings so the account is naturally almost wholly devoted to this country. Adequate discussion is given, however, of the possibility of the presence of a similar disease in Africa and elsewhere, caused by other species of onchocerca.

Part II by Jack H. Sandground can be dismissed with the comment that it is an ideal presentation of the revision of a nematode genus and might well serve as a model to all systematic helminthologists.

Part III by Joseph C. Bequaert is a useful summary of our knowledge of the life history and breeding habits of Simuliidæ and gives a general discussion of the worldwide distribution of this family of diptera. It ends with a taxonomic discussion and gives the diagnostic differences of the species important in America as carriers of this infection.

Part IV by Miguel Muñoz Ocha is a short account of the epidemiology of onchocerciasis in Guatemala and serves as a supplement to part I.

The volume is printed on heavy art paper and the illustrations are numerous and beautifully reproduced.

This is no. 6 of 'Contributions from the Department of Tropical Medicine and the Institute for Tropical Biology and Medicine', Harvard University.

We have not seen the other five numbers of this excellent production, but if they are of the same standard as the one under review they would be well worth acquiring. The book is only bound in paper, which is a pity as it is worthy of a much more impressive cover, possibly this has been done with the idea of reducing its cost. Unfortunately the price is not stated.

P. A. M.

INDIVIDUAL HEALTH. A TECHNIQUE FOR THE STUDY OF INDIVIDUAL CONSTITUTION AND ITS APPLICATION TO HEALTH.—By E. Obermer. Volume I. *Biochemical Technique.* By E. Obermer and R. Milton. 1935. Chapman and Hall, Limited, London. Pp. xvi plus 244. Illustrated. Price, 15s.

To be able to prevent disease by the promotion of health Obermer advocates a complete and exhaustive study of each individual with a view to assessing his or her functional efficiency so that the very earliest signs of dysfunction, strain and lowered resistance can be detected and treated before the disease has obtained its hold.

His study includes assessment of hereditary constitutional factors, external environmental factors and reaction of internal environment to present external environmental factors. He has included all these examinations under the term 'Adaptational Survey'.

The present volume written jointly with Milton describes the biochemical part of the technique of the 'Adaptational Survey'. The technique of the biochemical part of the investigation is very comprehensive including (1) the weighing and measuring of food for a twenty-four-hour period, (2) quantitative analysis of all the normal blood constituents, (3) detailed examination of each lot of urine passed over a period of twenty-four hours, (4) faecal analysis and (5) respiratory metabolism, etc.

Part I of this volume deals with the collection of specimens and their preliminary distribution. Part II

gives the details of the analytical technique. In view of the huge number of examinations required the methods described are for the most part microphotometric. Part II will serve as a useful handbook to workers in analytical chemistry who have to deal with a large number of specimens.

D.

PHYSICAL CHEMISTRY FOR STUDENTS OF BIOLOGY AND MEDICINE.—By David I. Hitchcock, Ph.D. Second Edition. 1934. Baillière, Tindall and Cox, London. Pp. xi plus 214, with 28 figures. Price, 12s. 6d.

This handy volume has been written with the object of enabling the students of medicine and biology to gain a working knowledge of the science of physical chemistry in order to appreciate modern biological research. The importance of physical chemistry as a basis for the explanation of the fundamental physiological phenomena is now well recognized and textbooks dealing with different aspects of the applications of physical chemistry in biology and medicine are very welcome. A preliminary discussion of some fundamental principles of physical chemistry has been followed up by some application of the principles, and a series of problems are set forth at the end of each chapter. These problems are very useful for the student in elucidating the principles explained, but they might have been followed by the mathematical solutions especially for the inquiring reader who is not guided by a teacher. In twelve chapters the author discusses a wide variety of subjects such as gas laws, solubility of gases, surface tension, viscosity, vapour pressure of solutions, diffusion, osmotic pressure, electrolytes, mass action, hydrogen ion concentration, colorimetric and electrometric determination of pH absorption, colloids, membrane equilibrium, equilibria in blood, reaction velocity and enzyme action, oxidation reduction potential and transformations of energy. In the second edition, these discussions are followed by a dozen laboratory directions for experiments which the student may carry out with profit. The apparatus suggested are simple in nature so that they may be found in most laboratories. There are some references in each chapter to special monographs and to journal articles and there is a bibliography at the end so that a reader who is specially interested in the subject may conveniently pursue the study further. It is a stimulating handy volume and will repay careful study.

S. G.

PHYSIOLOGY. (CATECHISM SERIES.) Fourth Edition. Part II. 1935. E. and S. Livingstone, Edinburgh. Pp. from 87 to 158. Price, 1s. 6d. Postage 2d.

THE systems taken up in this handy little book have been well written. Though it is a small book it contains useful and accurate information. The reviewer finds it to be a good book for ready reference by students and thinks it will be of great help to them in preparing for their oral examination. This part has been as well written as part I. The paper and printing are good. The publishers are to be congratulated on their achievement.

P. D.

A SHORT PRACTICE OF SURGERY.—By H. Bailey, F.R.C.S. (Eng.), and R. J. McNeill Love, M.S. (Lond.), F.R.C.S. (Eng.). Second Edition. 1935. H. K. Lewis and Company, Limited, London. Pp. viii plus 987, with 731 illustrations of which 84 are coloured. Price, 30s.

THE fact that a second edition of this book has made its appearance in a little over two years since its first publication is a true indication of its merit and appreciation of its authors.

Present-day surgery makes such rapid strides that a book soon becomes out of date, so Mr. Bailey and Mr. Love have completely revised their work in this

volume and have rewritten many of the original chapters.

Following the practice which was adopted in the previous edition, and in other books by these authors, advanced surgery and the more rare conditions are relegated to small type, so that a candidate for a qualifying examination can review in a rapid manner the more essential facts by confining himself to the material included in the larger print.

The book is on the short side, but it contains all the essential points which one would expect a 'Short Practice' to contain.

Whenever necessary, or wherever it is deemed to be a help to the student, the authors have included embryology and pathology. These subjects are well but scantily dealt with which is only natural in a volume of this size.

The book follows the usual scheme in that it begins with bacteriology, wound infection, follows on with gangrene, the granulomata and, finally, with the surgery of the various regions.

There is an interesting chapter on blood physiology and transfusion, and at the end of the book there is an extremely well written and practical chapter on infections of the hand.

The all important subject of appendicitis comes in for a great deal of discussion, and the merits and demerits of the Ockner-Sherren delayed method of treatment of the acute appendix are contrasted with those advocated by the immediate operative school, the authors being careful to maintain an impartial standpoint.

The true position of McBurney's point is described, i.e., between $1\frac{1}{2}$ inches and 2 inches from the anterior spine of the ileum upon a line joining that point to the umbilicus.

'The erroneous usurper which unfortunately has been copied from book to book is the point at the junction of the outer and middle thirds of the same line. This is much too medial'.

The section dealing with fractures bristles with good advice to the student; not the least being 'Always take x-ray photographs, even in cases in which there is but the merest possibility that a bone may be fractured, for it has been said that bones are not filled with red marrow, but with black ingratitude'.

A truism this, for in no other branch of surgery is laxity or alleged laxity in treatment so damaging to the reputation of the practitioner. One of the best chapters in the book is that on diseases of the breast; the description of carcinoma of this organ being very good and accompanied by several splendid coloured plates.

If we may point out a defect in an otherwise excellent description, the barrage method of radium treatment of carcinoma of the breast receives but a bare mention.

The book is beautifully printed on good paper, and contains 731 illustrations, 83 of them being coloured plates.

It is undoubtedly one of the best of the shorter textbooks on surgery.

H. E. M.

THE PRACTICE OF REFRACTION.—By Sir Stewart Duke-Elder, M.A., D.Sc. (St. And.), Ph.D. (Lond.), M.D., Ch.B., F.R.C.S. Second Edition. 1935. J. and A. Churchill, Limited, London. Pp. xv plus 383, with 180 illustrations. Price, 12s. 6d.

THIS is the second edition of this book which first appeared in 1928. The greater part of the text has not been altered but the book has been brought up to date by the addition of chapters which include the new work on the treatment of refractive errors, on the ætiology of myopia, the treatment of muscular imbalance and of squint by orthoptic methods, the refractometer and the use of contact glasses. The book is somewhat smaller than the first edition, this has been accomplished by cutting out some of the matter which seemed to be redundant.

The book is divided into six sections which deal respectively with eye-strain, refraction, accommodation and convergence, muscle balance, clinical methods and finally spectacles.

The whole subject of refraction is dealt with in a simple and essentially practical manner. The author points out that the book is clinical rather than theoretical but at the same time the art of refraction can only be mastered by careful and painstaking practice in a hospital in which large numbers of cases of various kinds are available.

The book on the whole is a most excellent one, well illustrated and written in a clear, simple style. It will be found invaluable to students and medical men interested in the study of ophthalmology.

E. O'G. K.

THE TREATMENT OF RHEUMATISM IN GENERAL PRACTICE.—By W. S. C. Copeman, M.A., M.B., B.Ch. (Cantab.), M.R.C.P. (Lond.). With a foreword by Sir W. Hale-White, K.B.E., M.D., F.R.C.P., Hon. LL.D. Second Edition. 1935. Edward Arnold and Company, London. Pp. viii plus 228. Price, 9s.

THE attitude of the medical profession towards diseases of the rheumatic group has undergone a considerable change during the last two decades. This can be explained partly as a natural evolutionary movement; with the advances in medical science its central objective has been raised to a higher plane—it is now the saving of health rather than the saving of life alone. This has meant that much more attention is being focused on chronic invaliding diseases such as rheumatism. An outward and visible sign of this changed outlook has been the establishment of the Red Cross Clinic for Rheumatism in Peto Place where seventy-eight thousand patients were treated last year.

Dr. Copeman has played an important part in the organization of this clinic. From his book on the treatment of rheumatism much was therefore expected and from the fact that the first edition was sold out in a few months it is obvious that expectations were fully realized; this second edition will, we foretell, prove quite as popular and it is hoped that the 'printing' has been sufficiently large to satisfy the inevitably greater demand.

No serious rearrangement has been made in the present edition, but certain chapters have been rewritten and all have been brought up to date. The treatment by gold salts has been introduced into this edition and there is reference to the revival of the 'bee-sting' treatment which has been rescued from the indigenous system (of Great Britain and probably many other countries) and resuscitated during the last year—much to the joy of the news-hungry lay press.

The pendulum of opinion regarding their aetiology is swinging away from the toxic origin of chronic rheumatic conditions towards the metabolic. Dr. Copeman's opinion is that a septic focus can be found in, say, 15 per cent (our figure) of cases; there is possibly an undiscovered focus in another 10 per cent, but not in the remaining 85 per cent, as some writers of the last decade seem to think. The remaining 75 per cent may be due to some causative factor which is no longer active, or to an inborn or acquired error of metabolism. With this very liberal attitude towards the aetiology of rheumatism it is obvious that he is unlikely to advocate any panacea for its treatment, and, in fact, he does not; nor does he condemn any of the popular methods, but is usually content to sound cautionary notes, though sometimes he says frankly that he has never seen any improvement following certain of them.

He gives the treatment of pain an important place and from this point of view his book will have a special appeal to the practitioner.

Whilst all right-minded medical writers must deplore the venial foibles, as well as the more serious ones, of his fellow practitioners and whilst it is justifiable to

refer to them in lectures by way of warning to students, they should be exhibited in medical writings as little as possible—for many reasons, not the least being that the writer who harps on them is liable to adopt a Pharisaical attitude. In this matter the author is not entirely innocent. One paragraph frankly puzzles the reviewer; it seems to him to be nothing short of a shadow boxing display. 'Pyramidon... may.... be equally correctly described as dimethylamino-antipyrin or even as dimethylamino-phenyl-dimethyl-isopyrazolone. This sort of thing carries a pseudo-scientific cachet which seems to be much exploited nowadays'. Who is it that is censured—the manufacturer, because he calls it pyramidon when it is really dimethylamino-etc., or because he lets us know that what he calls pyramidon is really dimethylamino-etc., or is it the practitioner because he prescribes dimethylamino-etc., or because he prescribes pyramidon and says casually to his patient 'Of course you know this is really-dimethylamino-etc.'? If a drug has a complicated chemical formula, it doesn't really seem to be an occasion for blaming the manufacturer. Admittedly every medical man won't be any wiser when he is told the full chemical name—but some will, and, in view of recent work, e.g., that on the aetiology of granulocytopenia (to which we found no reference in this book), no medical man should prescribe any of these analgesics without knowing more about their composition than the proprietary name tells him.

After this irrelevant digression, the reviewer feels that he cannot do better than summarize his general opinion of the book by saying that it gives an excellent presentation of the recent, more enlightened attitude towards the treatment of this most important of all invaliding diseases and that it is the ideal book for the general practitioner.

L. E. N.

BLOOD GROUPS AND BLOOD TRANSFUSION.—By A. S. Wiener, A.B., M.D. 1935. Baillière, Tindall and Cox, London. Pp. xiv plus 220, with 72 tables and 41 figures. Price, 18s.

THIS medium-sized book fulfils a need.

The facts concerning isohæmagglutination and the allied phenomena are adequately narrated. Their serological basis, as usually conceived of, is lucidly explained. Directions for practical work are full and the illustrations are excellent. The latter include figures, photographs and protocols of actual experiments. The table of racial distribution of the blood groups is comprehensive.

The mathematical propositions and procedures, in dealing with genetics and biometrics, are very simply given and prove the fact that it is possible to state a proposition without indulging in a morbid display of erudition in symbols or distorting letters of the alphabet. It is not necessary for any reader to skip this section of the book, as has been allowed for in the preface.

After an adequate statement of the usual categorical conception of the isoagglutinogens A, A₂ and B and their corresponding isoagglutinins a, a₂ and b the recent conception of an anti O agglutinin and its relation to the agglutinin a₂ has been duly introduced. Actually in the book the agglutinins have been designated α and β instead of a and b.

The agglutinogens M and N have probably been discussed for the first time in a book in English. Directions for their detection are as full as those given for detecting A, A₂ and B.

The medico-legal section is interesting and instructive. The five agglutinogens A, A₂, B, M and N will decide the question of paternity (and maternity) of a child in a much more reliable way than the mere resemblances which in infants and young children are mostly subjective.

The chapter on the technique of the transfusion of blood is well written. All the up-to-date contrivances have been described, including the *athrombit* containers

which retard coagulation for 30-60 minutes. The treatment of the subject of transfusion from a clinical point of view, however, is hardly an advance over what has been given in older books.

The findings from original papers have been collected and arranged in a logical sequence. Only two discrepancies arrest attention: (1) Figure 8 on page 16 shows a rapid increase of the agglutinins up to age 5-10 and then it almost uniformly declines up to 90-100. This occurrence has been described on pages 7 and 8 rather differently, thus: 'Further, the titre of the agglutinin in very young and old individuals is usually lower than that of the middle-aged individuals'. (2) On page 46 the detection of the transfused red blood cells of a different group, in the circulation of the recipient, some time after the transfusion, seems to be a direct evidence of the life of a red blood cell and not indirect.

There appear to be only two printer's errors: (1) On page 86, in an equation, 'a p' is situated higher than it should be. (2) The table 51, which appears to be important from the context, is missing.

Concerning the exposition of Mendel's laws a question may be asked. Having every rational right to represent the dominant green of the pea seeds by G (capital letter), why do authors insist on representing the recessive yellow by g (small letter). What is wrong with G (capital) and y (small)? A similar query is permissible concerning the alpha and the beta designating the isoagglutinins. What is wrong with the small letters a and b when the capital letters A and B designate the isoagglutinogens?

The book should be in the hands of all interested in blood groups.

S. D. S. G.

Abstracts from Reports

ANNUAL REPORT OF THE INSTITUTE FOR MEDICAL RESEARCH, KUALA LUMPUR, FEDERATED MALAY STATES, FOR THE YEAR 1933. BY P. H. MARTIN, ACTING DIRECTOR

MALARIA RESEARCH

The substitution of atabrin for quinine on estates

Work on the treatment of hospital patients with atabrin has been reported in the Annual Report for 1932. That work has been followed by an extensive study of the advisability of substituting atabrin for quinine in the treatment of malaria as it occurs on rubber estates, that is, among ambulatory patients who do not need in-patient hospital treatment.

Three series of experiments have been undertaken by Dr. Green.

In the first series, the efficiency, cost, and convenience of a mass treatment of all persons living in the estate lines with atabrin, followed by selective treatment of individuals who are subsequently found to be infected with malaria, has been compared with an ordinary quinine treatment, as frequently given in such lines. The treatment technique of this series could be undertaken only on an estate provided with a microscope and a dresser who is proficient in the examination of blood films. Dr. Green also discusses several important side-issues, such as the difficulties encountered by an estate dresser in administering quinine in curative doses in lines, also the influence exerted on the experiments quoted, and on the designing of any line of treatment by the constant changes in personnel. The experiments demonstrated the good effect on the spleen and parasite rates of giving curative doses of an anti-malarial drug (atabrin), as opposed to the common practice of giving quinine gr. x daily, for long and indefinite periods. The investigation was unavoidably terminated at the end of six months. The analysis of treatment given shows that the whole atabrin-treated group only required about one-quarter of the number of day treatments required by the quinine-treated control group, while each individual treated with atabrin was also under treatment for little over one-quarter the number of days of each individual treated with quinine. The costs in two instances chanced to coincide.

In the second series of experiments, all individuals, including new-comers, were given a preliminary five-day course of atabrin, and all cases subsequently showing any kind of fever were re-treated with atabrin. The scheme was intended to simulate conditions on an estate which was unprovided with a microscope. In spite of the fact that nearly half of the labourers were attacked with malaria during the seven

months of the experiment, the working efficiency of the group was maintained at a high level. The cost of atabrin per month per unit of population proved to be 75 per cent greater than the corresponding cost in the previous experiment.

In connection with the examination of about 800 persons, to whom the above two series of experiments relate. Dr. Green's records show that 323 cases of fever occurred. In 149, or 46 per cent of the 323 cases of fever (all proven by use of a clinical thermometer), malarial parasites could not be found in the thick films taken prior to treatment and examined by the staff of the malaria research division of this institute. This result is of particular local interest with regard to occurrence of 'fevers of unknown origin', since the method of blood examination by 'thick films' is the most efficient known, and during the experiments there had been no unusual incidence of influenza, measles, dengue, or other known febrile disease.

Since some of the advantages of atabrin noted in estate practice may have been due to comparison with quinine given in ineffective doses, the third series of experiments was planned to contrast atabrin treatment with quinine, given in short courses but in curative doses. Even should the quinine course be less effective as regards preventing relapses, three such curative courses of quinine could be given for the cost of one course of atabrin. Every case of malarial fever is receiving either a six-day course of atabrin or, for the control group, a seven-day course of quinine, in which every effort is being made to ensure that each day twenty grains of quinine are actually taken by patients of the control group. The experiment is still in progress, but figures obtained so far indicate a superiority of short curative doses of quinine over the prolonged courses, with an average dosage of ten grains daily.

In connection with experiments on the cost of different anti-malarial drugs, Dr. Green points out that the eventual expenditure on such drugs will depend on the facilities for malaria transmission on any particular estate, and consequently upon the efficacy of anti-larval measures. Further, if a patient has to receive in-patient hospital treatment, the difference in cost between atabrin and quinine becomes insignificant, since the total cost of either drug forms such a small part of total hospital charges.

Again, with regard to convenience of administration and to procuring an efficient course of anti-malarial treatment for each infected labourer, the fact that the daily curative dose of atabrin can be given at one muster, also the willingness of the labourers to take atabrin without fear of cinchonism, both assume considerable importance.

Tebetren

Dr. Green has treated 100 cases of malaria with tebetren.

His observations tend to confirm the opinion that tebetren is efficient in direct proportion to its hydroquinine content, which is about 80 per cent. No special advantage has been found by which tebetren is likely to overcome the disadvantage of its present high price.

A comparison of the properties of quinine, atebirin, and tebetren has been compiled. This comparison has been based on the initial degree of infection of the patient as shown by the number of malarial parasites per cubic millimetre of blood just prior to treatment. The effect of all these drugs, in respect of the points considered, appears similar, except that atebirin shows a marked superiority in preventing relapses.

'C. 77'

'C. 77' is a new drug, not yet released for general use, evolved by Professor Giemsa in conjunction with the manufacturers. At the request of Professor Giemsa, a small supply of this drug has been tested in the treatment of 21 patients. The drug has been found to be well tolerated, and its clinical action appears similar to, though slightly slower than, that of quinine.

Totaquina

A clinical trial of totaquina was commenced in 1932, and has been continued in 1933.

A series of over 400 cases of malaria has been treated either with totaquina or with quinine as a control. The scheme of treatment with totaquina was evolved locally, but approximates to that which the Malaria Commission of the League of Nations decided to adopt in 1933. Dr. Field's results have therefore been submitted in considerable detail to that Commission.

Totaquina is required to conform to definite standards. There are two different methods of production which may acquire economic importance in the future.

The findings are that totaquina is an effective anti-malarial drug slightly, but not significantly, less efficient in the immediate treatment of acute malaria than quinine, when either drug is given in curative dosage. Since it must conform to a standard in regard to its active principles, it is much to be preferred to the unstandardized and very variable cinchona febrifuge. The price at which it will be available must be a deciding factor in determining the extent of its adoption.

Natural infection

Examination of mosquitoes for natural infection has shown *A. umbrosus* with both mid-gut and salivary gland infections. This has been the first local confirmation of Barber's findings for 15 years.

A number of precipitin tests have been carried out to determine the origin, human or animal, of the blood on which trapped mosquitoes have fed.

Animal malaria

As a probable further complication in assigning significance to the finding of malaria-infected mosquitoes, comes the discovery that two other local mammals, namely, the flying-fox (Malay 'Kluang') and the common red-bellied squirrel (Malay 'Tupai') are infected with parasites of a malarial type.

Nothing has yet been found out as to the transmission of these parasites, but Dr. Green has already shown that monkey malaria may be confused with human malaria when local anopheline mosquitoes are dissected.

Yellow fever

Blood from 50 Malays was sent to New York at the end of 1932 for investigation as to the presence of substances protective against yellow fever. A report has been received from Dr. Sawyer stating that in no instance was any evidence of the presence of a protective substance found, which result supports the view of the Rockefeller International Health Division that yellow fever has not been in the Far East.

Rocky Mountain spotted fever and tropical typhus

In that field of research devoted to the elucidation of the complex and ever-enlarging group of typhus-like fevers throughout the world, attention has recently been focused on the determination of the degree of relationship that exists between the various entities of the group.

By means of 'protection' tests and cross-immunity experiments in laboratory animals, many interesting results have been obtained. In particular, the relationship of the Rocky Mountain spotted fever to other of the typhus-like fevers has received special attention. Thus, the immunological identity of Rocky Mountain spotted fever and the typhus of Sao Paulo has been shown.

Protection tests suggest the lack of any close relationship between Japanese river fever and South African tick-bite fever on the one hand, and Rocky Mountain spotted fever on the other.

The relationship of the *fièvre boutonneuse*, that occurs along the Mediterranean littoral, and Rocky Mountain spotted fever has been investigated by Parker, Badger and others in the United States of America, and by Brumpt in France. The former group of workers regards the two diseases as closely allied; the latter worker, as differing markedly.

Clear distinctions exist between Rocky Mountain spotted fever and the endemic typhus of the United States of America. Laboratory animals immune to the *tsutsugamushi* disease prove to have no immunity against Rocky Mountain spotted fever.

Towards the end of the year 1933, the collaboration of this Institute was invited by Dr. R. R. Parker (in charge of the Rocky Mountain Spotted Fever Laboratory, Hamilton, U. S. A.), with a view to an investigation of the relationship of the two types of tropical typhus that occur in Malaya, with Rocky Mountain spotted fever. The method of exchange of the respective viruses has been as follows: Nymphs and adults of the wood tick, *Dermacentor andersoni*, infected with the virus of spotted fever, have been received from Hamilton and successfully 're-activated'. Experience having shown that tissue virus of the two types of tropical typhus will not survive transportation of eleven days' duration, transportation in an insect vector is necessary; and for this purpose Dr. Parker has kindly forwarded to this laboratory a supply of uninfected *Dermacentor andersoni*. These have been allowed to feed on infected guinea-pigs of the 'Seerangayee' ('K') and 'Manickam' ('W') strains of tropical typhus, then removed, and returned to Dr. Parker for re-activation by feeding on guinea-pigs in his laboratory.

The experiments appear to demonstrate that immunization of rabbits to high titres with cultures of *Proteus OXK* or *OX19* affords no degree of immunity against subsequent infection with rickettsial passage virus derived from laboratory animal strains of the tropical typhus-Japanese river fever group of fevers, which passage virus is known constantly to provoke agglutinins to such cultures in rabbits infected by it; and, conversely, that the presence in rabbits of an immunity to the above rickettsial passage virus, with accompanying presence in the serum of agglutinins to cultures of *Proteus OXK* and *OX19*, in no way modifies the development of agglutinins evoked by subsequent successive inoculations of cultures of these *Proteus* strains.

THE UNION MISSION TUBERCULOSIS SANATORIUM, AROGYAVARAM, NEAR MADANAPALLE, SOUTH INDIA, ANNUAL REPORT, 1933-1934. BY THE ACTING MEDICAL SUPER-INTENDENT

Short history

The Union Mission Tuberculosis Sanatorium is an institution established by the united efforts of several missionary societies working in South India.

The first steps towards it were taken in 1908, when a few medical missionaries talked over the possibility of such an institution. On 24th October, 1912, the representatives of seven missions organized the U. M. T. Sanatorium Committee. This committee took over a small temporary sanatorium, which had been maintained for two years in Madanapalle by the American Arcot Mission. At the same time, an extensive and beautiful site was secured four miles outside Madanapalle, and in 1913 the building of the sanatorium was begun.

On 19th July, 1915, the U. M. T. Sanatorium was officially opened by the Governor of Madras.

As the sanatorium stands to-day its construction and equipment have cost about Rs. 4,00,000. Of this amount the Government of Madras has provided Rs. 1,60,000 as building grants, while the Sanatorium Committee has found the remainder Rs. 2,40,000 from other sources.

During the nineteen years of its existence, 5,649 patients have been admitted.

Situation and climate

Arogyavaram, the name given to the sanatorium, is situated in North Latitude 13° 33' 37", and East Longitude 78° 32' 45" and is about 2,500 feet above sea-level.

The distance from Madanapalle Road Station, on the M. and S. M. Railway, is four miles on the road to Madanapalle.

The climate is dry, as the average rainfall for the whole year is about 28 inches. Fresh winds blow almost all the year round. The hills, which at some distance encircle the place, act as a protection against too heavy monsoon storms. Being situated on land covered with vegetation away from crowded habitations, the sanatorium enjoys an atmosphere free from dust. During the cold season the maximum temperature usually ranges between 70° and 80°F.; and during the hot season, April to May, between 95° and 102°F. The nights are always refreshingly cool. As the climate is more or less equable, all seasons are beneficial for the treatment of tuberculosis.

The sanatorium grounds

The sanatorium owns about 300 acres of land, of which about 200 form the compound proper. There are 126 separate blocks and buildings and 104 thatched buildings including temporary wards, kitchens and servants' houses.

In the compound are flower gardens and also vegetable gardens. A part of the grounds has been converted into a park with seats and shady walks for the women patients, while in the rest of the sanatorium roads, pathways and seats amid beautiful surroundings have been provided for the men patients.

The sanatorium with its extensive grounds, many buildings, roads with electric lights, its water system, church, school, post and telegraph office and a population of about 700, has come to have all the elements of life in a small town, while enjoying all the advantages of the open country.

Maintenance

The sanatorium is a mission institution supported by the annual contributions of the co-operating missions. At present fourteen missionary societies constitute the union. The sanatorium receives an annual grant from the Government of Madras. Beyond the

income from these sources, the sanatorium is financially dependent on the income from paying patients and on private donations.

Object and methods

The object of the sanatorium is to offer to consumptive patients in India such help as medical science is able to give. It is run on the same scientific lines which have proved successful in Western countries, but with such modifications as are required by the special local conditions.

In earlier years sanatoria were primarily intended for the treatment of only early cases of tuberculosis, but modern developments and experience in the treatment of the disease have shown that they are the best places for the treatment of many of the cases of advanced disease as well. This is our experience also.

During the last fourteen years, since 1920, out of 3,163 patients discharged and included in our medical statistics, 572 or 18.1 per cent were in stage I or early cases, 695 or 22.0 per cent in stage II or medium severe cases, while 1,896 or 59.9 per cent were in stage III or advanced cases.

Accommodation

The number of beds available in the sanatorium, which in 1915 when it was opened was 109, is now 230.

There are nine general wards, with a total of 134 beds. Seven wards contain eighteen beds each, five of these wards forming a unit for men, and two a unit for women. To each of these units is attached a smaller ward with four beds, intended for Anglo-Indian men and women respectively.

Two semi-general wards have been constructed containing four beds each, respectively for men and women.

The special wards contain each one or two beds; in the latter case the ward is divided by a partition.

The illustrations in this report show that the above account of its surroundings is in no way exaggerated. Also the photographs of the wards, operating theatre, electrical treatment rooms, etc., show that the equipment is very up to date. This institution appears to be doing valuable work.

WAR OFFICE REPORT ON THE HEALTH OF THE ARMY FOR THE YEAR 1933. PRICE 2s. 6d. POSTAGE EXTRA

In the following abstract we have only noted that portion of the report which deals with the Army in India, and even from this we have been compelled to omit a great deal of interesting matter. Our readers, especially those interested in public health, are referred to the original in which they will find a great deal of very valuable information.

Principal diseases affecting the troops

Cerebro-spinal meningitis.—Hitherto only sporadic cases have occurred among British troops at rare and irregular intervals. Among Indian troops, cases have been more common, particularly in certain recruiting battalions. The disease, as it occurs in India, is of a severe and fulminating type, and death frequently ensues within 48 hours of the onset of the symptoms. The mortality rate is extremely high, averaging 70 per cent over five years.

The disease has of recent months shown a marked increase among the civil population and the situation presents several disquieting features.

Dengue.—As heretofore, the majority of the cases of dengue has occurred in the personnel of garrisons in seaport towns. Owing to the proximity of the barracks to areas occupied by the civil population, the problem of eliminating the vector of the disease is a very difficult one.

Sand-fly fever.—The figures for sand-fly fever have remained at a very constant level for the last three years. The majority of cases continue to occur in Northern India, particularly in certain stations on the North-West Frontier.

The disease has been the subject of special investigation during the year.

The entomological aspect of the problem has been studied in Landi Kotal, where the investigations were directed by a specially-trained worker detailed by the Indian Research Fund Association. The exact local conditions required for sand-fly breeding were defined, and, once this had been done, no difficulty was experienced in locating innumerable breeding places. So widespread are these conditions that the problem of control appears, under Indian conditions, to be practically insoluble. In compact and well-administered areas such as Landi Kotal itself, something might be accomplished; in straggling cantonments such as Peshawar, the problem is a hopeless one. Work is, nevertheless, being carried out to determine the best method of treating breeding areas so that this knowledge may be available should special circumstances arise calling for its application.

The investigation of the etiology of the disease has produced interesting results, and it can confidently be stated that sand-fly fever of the Indian Frontier is not leptospiral in origin.

On the other hand, experiments which are not yet in a final state leave little doubt that a filter-passing virus is responsible, and attempts are being made to obtain this virus in a fixed form, in the hope that this may prove a stepping stone to the production of some form of immunizing agent.

Fevers of the typhus group.—An increase in the number of cases of this condition which have been diagnosed is probably to be attributed to a more widespread knowledge of the subject. Including all ranks British and Indian, and their families, 44 cases, with 1 death, were reported.

While the disease is more common in certain localities than in others, it is nevertheless widespread throughout the country.

No definite progress has been made as regards the detection of the vector of this disease in India, but opinion is gaining weight that the tick is by no means the only arthropod involved.

Diphtheria.—Diphtheria is a disease in which the information given by the laboratory can on occasion be very confusing. In the straightforward case with clinical signs no difficulty exists. Treatment is inaugurated at once on the strength of the clinical data, and the laboratory affords confirmation of the correctness of the procedure. In cases which clinically are suggestive, but doubtful, the result of the examination of a swab is invaluable. But in those cases of sore throat where no suggestion of diphtheria exists, but where a precautionary swab is taken, the outcome is often dire confusion. Experience has shown that innocuous diphtheroids which are morphologically indistinguishable from *Corynebacterium diphtheriae* are of relatively common occurrence. Where such are found in the swab, few clinicians will accept the responsibility of treating the case other than as one of diphtheria until negative information is afforded by biochemical or biological tests. This involves the swabbing and segregation of contacts, and frequently leads to numbers of men being unnecessarily off duty.

To minimize this as much as possible, special investigations have been made into the technique of isolating and testing the virulence of the organism, and a method has been devised which reduces considerably the interval of time necessary to give a definite result.

Dysentery.—The 1933 figures are slightly higher than those of 1932, but the variation is trifling. Nevertheless there has been in the last ten years an upward trend in the admission ratio for these diseases.

A study of the different types of infection in bacillary dysentery throws an interesting light on the epidemiology of the disease. Some 15 to 20 types of dysentery bacilli, of which 10 are of comparatively common occurrence, can now be differentiated. Occasionally there may be a group or series of cases which is caused by the same type of organism and is therefore referable to a common source. More frequently, however, this is not the case, and, if an analysis is made of the types of bacilli in all cases occurring in a regiment in one season, it will be found that great diversity exists and that few, if any, of the cases are etiologically related to one another. In other words, infection is not due to case-to-case spread within the unit so much as to a constant bombardment from the massive and varied reservoir which exists among the civil population.

Enteric fevers.—The variation in the number of cases occurring among British troops in these three years is trifling. In the year under review, as compared with last year, there was a decrease of 8 admissions for typhoid fever, 8 for paratyphoid A and 1 for paratyphoid B, and an increase of 2 for the enteric group, thus giving an overall decrease of 15 cases.

The position as regards diagnosis remains unchanged. Early blood culture is without question the most satisfactory method. Faeces and urine culture lend little assistance, and the agglutination test, while on occasion it may be of positive value, is of no negative significance. For use in this test, concentrated suspensions of organisms are being issued, with satisfactory results. Owing to the certainty with which batches of suspension can be prepared of a uniform standard the 'standard agglutinin unit' is being abandoned, and results will be expressed in terms of the denominator of the dilution in which standard agglutination occurs, an interpolation table being used where necessary.

The proportionate admission ratio, case mortality and death ratio among men over 1 year's service and under 1 year's service are:—

	Over 1 year	Under 1 year
Admission ratio ..	1	4
Death ratio ..	1	2.1
Case mortality ..	1	8.6

There are various causes which may contribute to this state of affairs. Assuming exposure to infection to be more or less universal and inevitable, susceptible individuals, who have little or no resistance even after inoculation, are likely to be picked out early in their Indian service. Naturally developed immunity will be higher the longer the man serves in the country, and in the same way repeated inoculation may have a cumulative action. Also the older soldier becomes more experienced in looking after himself.

Malaria.—In discussing malaria incidence in 1933, comparison will be made with the incidence in 1932 and in 1924. These two years have been chosen because, within recent times, the former was the best, and the latter was the worst, malaria year for British troops in India.

In India, the most important factor is the weather. On meteorological grounds alone it is easy to understand why 1933 was a worse malaria year than 1932; but these grounds do not serve to explain why it was so much better than 1924. Meteorological conditions in 1933 were unusual. In the June to September period the rainfall was much above normal over the whole of India, the north-east and Burma excepted.

Marked local excesses in rainfall are quite common; but it is very uncommon to find such generalized and heavy excess as occurred in 1933.

The dominance of meteorological conditions over malarial incidence is well seen if the malaria figures are studied in conjunction with the rainfall-temperature-humidity reports issued by the India Meteorological Department; but as, to the general reader, the study of masses of figures is a wearisome business, the

table which follows provides merely enough data to illustrate the general effect of weather conditions on the three selected years—1924, 1932 and 1933.

TABLE
Meteorology—mean of all India

	Worst malaria year (1924)	Best malaria year (1932)	Year under discussion (1933)
Period June to September—			
Rainfall: Percentage departure from normal	+8	—3	+14
Temperature (°F.): Departure from normal	+0.4	+0.5	—0.6
Relative humidity at 8 a.m. (per cent): Departure from normal	0	—2	+2
Whole year—			
Malaria incidence per 1,000.	206.8	84.1	103.3

Anti-malaria finance remained unchanged. The decision, made in 1931, to abandon the mosquito-proofing of barracks until the financial situation improves, still holds good. The value of mosquito-proofing is shown at Mian Mir, now known as Lahore Cantonment. In this notorious station the average annual malaria incidence for the five years 1923 to 1927 was 743. Proofing was carried out in 1927 to 1930. The average annual incidence, 1928 to 1933, was 124.4.

In 1933 there were two important factors in favour of a good malaria year.

Firstly, in 1932, malaria incidence for British troops was unusually light and the 'carry over' of infection to the following year was comparatively small. The importance of this as regards the 1933 figures need not be stressed.

Secondly, in 1933, the administration of plasmoquine was standardized and general.

In the report for 1932 it was stated '.... the tentative opinion is now expressed that the more extensive and intelligent use of plasmoquine is mainly responsible for the fact that 1932 was a record year'.

The opinion is held that, had it not been for the standardized, general use of plasmoquine, the 1933 figures would have been a good deal worse than they actually were.

It is now possible to draw certain general conclusions from evidence obtained by trained observers working on a perfectly controlled and disciplined population, viz—

1. It has been shown that, under the strictest conditions, quinine-plasmoquine can effect a remarkable reduction in malaria relapse rates.

2. Under general practice conditions this reduction is not so striking. Thus, in 1933 the relapse rate for quinine-plasmoquine was 30 per cent; but, as this was the first 'general practice year', it is not unreasonable to suppose that this figure may improve with familiarity and experience.

3. Atebrin-plasmoquine also effects a remarkable reduction in relapse rates. This reduction, as noted in 1933-34, was not so striking as that referred to in paragraph 1 above, but it was more marked than that referred to in paragraph 2. This is of some interest because the conditions under which the trial was made fell midway between those mentioned in paragraphs 1 and 2; that is, they were not of the strictest, but they were stricter than general practice conditions.

4. Although there is no great difference in results, still it seems as if the treatment accorded to a group receiving atebrin over seven days was more efficacious than the treatment administered to a group which received atebrin for five days.

These results secured a place for atebrin on the official list of drugs.

The routine treatment of malaria in the Army in India is now based on the following scheme:—

I. Benign tertian malaria

(a) Quinine, 20 grains, with plasmoquine, 0.03 gramme, daily for 21 days; or

(b) Atebrin, 0.3 gramme, daily for 7 days, followed by plasmoquine, 0.03 gramme, daily for 5 days.

II. Malignant tertian malaria

(a) Treatment by quinine, as the case indicates, with a course of plasmoquine (0.03 gramme for 5 days) during convalescence. If necessary (*d.g.*, if crescents be found in thick smears) a repeat course of plasmoquine may be given later; or

(b) As in I (b) above.

Medical officers are, however, allowed much latitude in dealing with this form of malaria, and are encouraged to adopt more drastic measures whenever clinical conditions indicate a severe form of the disease.

III. Quartan malaria

As in I (b) above.

Indian patients are also treated as described above, except that they receive only two-thirds of the British dose of plasmoquine, *viz.* 0.02 gramme daily, administered in 0.01 gramme doses, morning and evening.

After careful consideration it was decided to abolish the Malaria Treatment Centre at Kasauli from the end of the financial year 1933-34. This decision was arrived at because, owing in large measure to the methods of treatment which have been built up on the results obtained at this centre, the type of malaria case with which it was mainly concerned had practically ceased to exist. The centre therefore came to an end chiefly because of the success of its own efforts.

Tuberculosis.—There were 46 admissions for pulmonary tuberculosis, with 2 deaths, and 49 men were sent home as invalids. The ratios per 1,000 were: admissions 0.8, deaths 0.04 and invalids sent home 0.89. The admission and death rates are an improvement on those of the previous year.

Veneral diseases.—The all-India ratio per 1,000 was 33.4. In 1932 it was 37.7.

The incidence of each member of the group, in ratios per 1,000, was:—

Gonorrhoea, 23.2; syphilis, 4.9; soft chancre, 5.0.

Diseases of the respiratory system.—The admissions under this group were 1,198, giving a ratio of 21.8 per 1,000. In 1932 the ratio was 25.3.

Acute and chronic bronchitis and catarrhal pneumonia accounted for 800 admissions, with 4 deaths and 9 invalidings. There were 113 cases of pleurisy and 47 of laryngitis.

Lobar pneumonia accounted for 142 admissions (2.6 per 1,000) and 11 deaths. The case mortality was 7.7 per cent. In 1932, 3.4 per 1,000 were admitted, with 24 deaths and a case mortality of 12.8 per cent.

Ophthalmology.—The decision to accept Indian recruits suffering from mild trachoma has proved to be a step in the right direction, and the policy is being extended in other ways. Thus, at one time, it was customary to segregate boys suffering from trachoma at King George's Royal Indian Military School, Ajmer, from their healthy comrades. With suitable precautions, this custom has been abolished and no fresh case of trachoma has occurred among the boys.

Service Notes

APPOINTMENTS AND TRANSFERS

COLONEL H. C. BUCKLEY, Inspector-General of Civil Hospitals, Bihar and Orissa, is transferred, for the remainder of his term, to the post of Inspector-General of Civil Hospitals, United Provinces, with effect from the date on which he assumes charge of that post, *vice* Colonel A. H. Proctor, D.S.O., granted leave preparatory to retirement.

Lieutenant-Colonel P. S. Mills, Civil Surgeon, Ranchi, is appointed to officiate as Inspector-General of Civil Hospitals, Bihar and Orissa, with effect from the date on which he assumes charge of that post.

Lieutenant-Colonel N. S. Sodhi, M.C., Civil Surgeon, Lahore, is appointed to officiate as Inspector-General of Civil Hospitals, Burma, with effect from the 8th April, 1935, *vice* Colonel C. A. Gill, granted leave preparatory to retirement.

Lieutenant-Colonel K. G. Gharpurey is appointed to officiate as Surgeon-General with the Government of Bombay, with effect from the 18th April or any subsequent date on which he assumes charge until such time as the officer selected to hold the post permanently joins.

Lieutenant-Colonel R. L. Vance, an Agency Surgeon, is posted as Residency Surgeon in Kashmir, with effect from the forenoon of the 1st May, 1935.

Major R. S. Aspinall was appointed Civil Surgeon, Simla West, from the 10th to the 16th April, 1935.

The services of Major G. D. Malhoutra are placed at the disposal of the Government of the United Provinces for employment in the Jail Department, with effect from the 6th April, 1935.

The services of Major R. S. Aspinall, Civil Surgeon, Simla West, are replaced at the disposal of the F. & P. Department, with effect from the 17th April, 1935.

Major H. Williamson, O.B.E., an Agency Surgeon, on return from leave, is posted as Residency Surgeon, Hyderabad, with effect from the forenoon of the 19th April, 1935.

The unexpired portion of his leave is hereby cancelled.

Major J. M. Shah, Specialist in Venereal Diseases for the Bombay Presidency, Bombay, to be Officiating Superintendent, J. J. Hospital and B. J. Hospital for Children, in addition to his own duties, during the absence, on leave, of Lieutenant-Colonel Vazifdar.

The services of Captain B. Temple-Raston are placed temporarily at the disposal of the Government of the Punjab, with effect from the 15th March, 1935.

Dr. S. S. Ahluwalia is appointed as District Medical Officer (on probation) and is posted to the N. W. R., with effect from the 30th March, 1935.

Captain H. S. Waters is appointed temporarily to the post of Civil Surgeon, Simla West, with effect from the 17th April, 1935.

Captain J. C. Drummond, on return from deputation to the Millbank Course, is placed on general duty at the Medical College Hospitals, Calcutta, until further orders.

Captain J. C. Drummond, on general duty at the Medical College Hospitals, Calcutta, is appointed to act, until further orders, as Professor of Clinical Surgery, Medical College, Calcutta, during the absence, on leave, of Lieutenant-Colonel F. J. Anderson.

LEAVE

Major-General H. R. Nutt, K.H.S., Surgeon-General with the Government of Bombay, is granted leave on average pay for 3 months and 27 days preparatory to retirement, with effect from the 18th April, 1935, or any subsequent date on which he may avail himself of it.

Colonel C. I. Brierley, C.I.E., Inspector-General of Civil Hospitals, N.-W. F. P., is granted leave on average pay for 25 days and leave on half average pay

for 7 months and 5 days, with effect from the 3rd July, 1935, preparatory to retirement.

Colonel C. A. Gill, K.H.S., Inspector-General of Civil Hospitals, Burma, is granted, with effect from the 30th March, 1935, leave on average pay for 3 months and 18 days, combined with leave on half average pay up to and including the 11th August, 1935, preparatory to retirement.

Lieutenant-Colonel B. Higham, Chemical Analyser to Government, has been granted, preparatory to retirement, leave on average pay for 8 months followed by leave on half average pay for 17 days, with effect from 27th March, 1935.

Lieutenant-Colonel A. Y. Dabholkar, M.C., Director of Public Health for the Government of Bombay, was granted leave on average pay for 8 months out of India from 1st April, 1935, or subsequent date of relief. He is hereby permitted to convert 2 months of that leave into study leave.

Lieutenant-Colonel R. F. D. MacGregor, M.C., an Agency Surgeon, is granted leave on average pay for 1 month and 29 days, combined with leave on half average pay for 4 months and 2 days, with effect from the forenoon of the 19th April, 1935.

Lieutenant-Colonel B. G. Mallya, Civil Surgeon, Howrah, is granted leave for 1 month, in extension of the leave already granted to him.

Lieutenant-Colonel F. J. Anderson, Professor of Clinical Surgery, Medical College, Calcutta, is granted leave for 4 months, with effect from the 20th May, 1935, or from the date on which he may be relieved, and in continuation study leave for 1 month.

Lieutenant-Colonel M. J. Holgate, O.B.E., Civil Surgeon, Karachi, is granted leave for 4 months and a half, with effect from the 30th May, 1935.

PROMOTIONS

Majors to be Lieutenant-Colonels

P. R. Vakil. Dated 4th April, 1935.

J. L. D. Yule. Dated 7th April, 1935.

M. L. Dhawan. Dated 28th April, 1935.

B. S. Dhondy. Dated 28th April, 1935.

Captains to be Majors

K. M. Bharucha. Dated 13th April, 1935.

K. R. Sahgal. Dated 26th April, 1935.

The provisional promotion to present rank of Major J. McM. Wilder is confirmed and antedated from '28th September, 1933' to '28th March, 1933'.

Lieutenants on probation to be Captains on probation,
Dated 1st August, 1934

J. Brebner.

W. J. Virgin.

H. W. G. Stuntor.

Dated 15th August, 1935.

J. D. Gray, C.M. (McGill).

Dated 20th October, 1934

D. W. Taylor.

Dated 22nd October, 1934

P. H. Addison.

Dated 25th October, 1934

C. U. Wickham.

Dated 5th February, 1935

S. G. O'Neill.

F. I. Doherty.

J. W. D. Goodall.

Dated 13th February, 1935

C. B. Miller.

Dated 23rd April, 1935

D. P. Dewe.

M. G. Leane.

G. E. S. Stewart.

RETIREMENTS

Colonel J. P. Cameron, C.S.I., C.I.E., V.H.S., 15th February, 1935.

Lieutenant-Colonel A. F. Hamilton, C.I.E., 25th March, 1935.

Lieutenant-Colonel J. M. G. Skinner, 14th April, 1935.

Lieutenant-Colonel J. B. Lapsley, M.C., 20th April, 1935.

Notes

THE ROMANCE OF EXPLORATION AND EMERGENCE FIRST-AID FROM STANLEY TO BYRD

THIS is a small book containing brief records of the exploits of the chief explorers the world has known. It has been issued in connection with the Chicago Exposition of 1934 by Messrs. Burroughs Wellcome & Co.

Earlier explorers than Stanley are mentioned, but from the point of view of the purpose of this booklet, which is to advertise fitted medicine chests and first-aid kits, he is the first, for he was apparently the first notable explorer to use one of these chests. It is a remarkable testimonial to the excellence of this equipment that practically every traveller or explorer of note on land, sea and air from the time of Stanley to the present day, whether British or not, has made use of them and all testify to their value.

The book is copiously illustrated with reproductions of good photographs and is well printed on good paper. It is a thoroughly pleasing form of advertisement.

BOVRIL, LIMITED

DIRECT NUTRITIVE VALUE OF BOVRIL.

At the Thirty-eighth Annual General Meeting of Bovril, Limited, held in London on the 7th March, 1935, Lord Luke, the chairman, dealt with the results of the past year and explained the financial position, etc., and the resolutions were duly carried.

SIR JAMES CRICHTON-BROWN'S SPEECH

Sir James Crichton-Browne, M.D., LL.D., F.R.S., paid a high tribute to the efficacy of Bovril as a safeguard against the malnutrition which is responsible for so much ill-health. He recalled how the researches of the late Professor Sir W. H. Thompson, of Trinity College, Dublin, undertaken at the request of the Local Government Board of Ireland, had proved beyond doubt that, in addition to its direct nutritive value, Bovril possessed remarkable powers of promoting the digestion and the assimilation of other foods to which it was added.

Sir James said that without mastication, by virtue of those extractives in which Bovril was rich and which imparted to it its aroma, it increased the salivary flow, activated the gastric secretions, and conduced to the production of those hormones which were now known to be necessary to the maintenance of health. At every stage it ministered to healthy functional activity in the alimentary canal and compensated in some measure for the excess of carbohydrates with deficiency of protein and fats which, in the dietaries of the day, was probably responsible for much malnutrition.

A teaspoonful of Bovril does not seem much, but the nutritive value of foods cannot be measured by their bulk.

SERRAVALLO'S TONIC

THIS is described as a mixture of cinchona and iron in a good quality Marsala wine.

From the numerous testimonials supplied by medical practitioners it appears to be of use in treatment of anæmias of the chlorotic type and is widely used in Europe and to some extent in Great Britain. We have not seen a sample of it but the *Lancet* has analysed it and states that both iron and cinchona alkaloids in sufficient quantity to be of medicinal value are contained in the mixture.

AO TUBERCULIN VACCINE

TUBERCULOSIS vaccine is a preparation of tubercle bacilli originated by Arima, Aoyama and Ohnawa in Osaka, Japan, and licensed by the Japanese Government in 1927. According to the originators, AO is made from tubercle bacilli of the human type. It is sterile, consists of the native protoplasm of the bacilli, is easily absorbed, is completely innocuous, is derived from strongly immunizing strains of bacilli, and has a uniform potency. It is sterile and there is no danger of

infection. As it consists of the native protoplasm of the bacilli, it is able to immunize the inoculated organism in the same way as the organism is immunized by infection with live tubercle bacilli. As it is easily absorbed, it acts quickly as an antigen by causing the production of antibodies in the inoculated organism. The easy absorbability is brought about by the autolytic changes which, during the long cultivation, take place in the bacilli, which are devoid of waxy substances. AO is innocuous, as its use in 400,000 patients in different parts of the world up to the end of 1932 shows. No ill effects have resulted from its administration up to the time of writing. Its potency is constant, as its efficacy is measured by a special immunobiologic method and is expressed in antigen units (AE). The application of AO is three-fold: it may be used for prophylaxis, diagnosis and therapy.

Further particulars can be had from the Sole Agents, T. M. Thakore & Co., 43, Churchgate Street, Fort, Readymoney Mansions, Bombay.

BENGER'S FOOD

We have received the following cable from the *Statesman*:—

'All stocks of Benger's Food in India have been requisitioned by Government authorities for use of earthquake survivors (vide *Daily Mail*, 5th June).

Benger's Food Limited desire to make known that as supplies of Benger's Food in India have been requisitioned by the Relief authorities they are using every effort to replenish stocks with all speed. Fresh supplies of Benger's Food are being despatched to India by every available route.

In the meantime Benger's Food Limited request consideration of the public in this time of emergency should inconvenience be experienced in obtaining Benger's Food'.

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Original Articles

A RECORD OF FIVE YEARS' ANTE-NATAL AND INFANT WELFARE WORK ON ESTATES IN MALAYA

By J. G. REED, M.R.C.S., L.R.C.P.

Sungkai, Perak, Federated Malay States

Introduction.—The work here recorded has been carried out on a group of seventeen rubber estates served by a central group hospital and situated on the western coastal plains of Malaya. The majority of the estates are small, the largest

until recent years there has been a steady flow of recruited labour from south India. This may be said to have ceased by August 1930, and it is unfortunate that the acute depression in the industry has rendered figures and conditions not strictly comparable from year to year and has made progress more difficult by reason of financial stringency. A number of coolies are engaged locally and these are controlled so far as possible by medical inspection and rejection of the obviously unfit.

Vital statistics.—Some vital statistics of the group are given in table I. The figures for group D in the last horizontal column are from another group of six estates adjoining the group under consideration and are given for purposes

TABLE I
Vital statistics

	Estates population, monthly average	Deaths	Death rate per mille	Births	Birth rate	Deaths under 1 year of age	INFANT MORTALITY	
							Crude	Corrected
Whole group A Average for 4 years, 1925—28.	5,606	184	33.1	..	..	..	..	..
1929 ..	5,761	149	25.9	235	40.8	54	230	..
1930 ..	5,533	117	21.1	261	49.0	41	157	162
1931 ..	4,236	97	22.9	216	50.5	44	204	192
1932 ..	3,348	60	17.9	173	52.0	35	202	182
1933 ..	3,229	54	16.7	161	49.8	25	155	152
Average for 5 years, 1929—33.	4,421	95	20.9	209	48.4	40	190	..
Group B Average for 5 years, 1929—33.	740	13	18.4	44	59.3	6	153	..
Group C Average for 5 years, 1929—33.	786	23	27.5	26	36.2	6	240	..
Group D Average for 4 years, 1930—33.	2,387	40	16.4	119	50.5	13	105	..

being of three thousand acres. The estates nearer the sea are subject to malaria carried chiefly by *Anopheles (M.) sundicus (ludlowi)* breeding on adjacent native-owned land where adequate measures of mosquito control cannot be carried out. Estates situated farther inland are practically free from malaria. The average hospital malaria rate for the group for the five-year period under consideration was 5.8 per cent per annum.

The estate workers are Indians, the great majority Tamils, and a considerable proportion has been settled in the district for many years, a number having been born on the estates, but

of comparison. Similar though rather less intensive ante-natal and infant welfare work has been carried out in this group. The great difference between the two groups of estates is that malaria is not endemic on any estate of group D. It has occurred only in sporadic outbreaks on one estate of this group, where *Anopheles (A.) umbrosus* was the carrier, and the population of the group has not been subjected to the marked deleterious effect on general health which is always the result of endemic malaria, even of moderate intensity, and which usually manifests itself notably in the infant mortality statistics. The average hospital

malaria rate for group D for the years 1930—33 was 4.1 per cent per annum.

The figures for group B are taken from three non-malarious estates and those for group C from three moderately malarious estates. These two groups are referred to more fully when table II is discussed. Groups B and C are included in the main group A, while group D is not.

The corrected infant mortality rate is calculated by taking the number of births in a given year as 75 per cent of those actually taking place in that year plus 25 per cent of those taking place in the preceding year. This gives an approximate correction for migration.

It is unfortunate that complete figures are not available for comparison, for the five-year period before ante-natal and infant welfare work was commenced, but consideration of table I compels realization of the necessity for ante-natal and infant welfare work. In 1929 and 1930 over one-third, and in the following three years nearly one-half of the total number of deaths were of infants under one year of age. In England and Wales in 1930, with an infant mortality of 60, the number of infant deaths was about one-twelfth of the total number of deaths. This divergence can only in part be accounted for by the repatriation of a number of old and decrepit coolies, especially in times of economic depression.

Outline of the work.—Observations were commenced on pregnant women during 1929, and at the beginning of 1931 a card index system was instituted which includes also on each card a monthly record of the weight of the infant until it reaches the age of one year. The card is reproduced here. At present not all the items are entered in every case, but the card is designed to be as comprehensive as possible in order to cover abnormal cases and to allow for scope in development of the work. The observations are recorded in the first instance by the estate dresser if there is one, or, if there is not, by a travelling dresser from the group hospital. All cases with any sign or history of abnormality are brought to the hospital for examination, treatment or admission. With the co-operation of the estate staffs we have had little difficulty with the women, though, as they do not like to come for delivery to a group hospital which may be several miles from their estate, this is not insisted on except in case of abnormality. Further, in the same way we keep in touch with the progress of the infants, who are weighed monthly and brought to hospital when necessary. The advantage of the above arrangement is that the women are continuously under the observation of the same staff for as long as required, both before and after confinement. When a woman passes through subsequent pregnancies there is ready to hand her past history and that of her children. Attention has recently

been drawn to the lack of such continuous supervision in Britain. The work has been carried out without special staff and at very small expense. The chief difficulties encountered are the ignorance and superstition of the coolie, but these can be overcome to a great extent by a tactful subordinate staff with time and patience. Transport too is inadequate. One does not know until it is tried which measure will merely irritate the coolie and which she will readily tolerate, but the impression gained on the whole is that many women come to appreciate what is done for them, while others regard it as a routine of estate discipline.

The obvious weak point in the scheme is the absence of supervision of deliveries in the estate lines. Even where there is an estate dresser, he is not usually called to a confinement case until after the delivery. The coolie does not desire supervision of delivery and the present economic conditions make it difficult to enforce it as a new measure. Efforts to induce women of the coolie class to come to the hospital for elementary training, to enable them to act afterwards as midwives on the estates, have met with no success, nor has the employment of a trained midwife at the hospital proved satisfactory. Nevertheless some such supervision is certainly needed. A first-hand account of the native methods of delivery and care of the puerperal woman and the new-born infant makes startling reading. The subsequent figures in this paper indicate that it is the time shortly before, during and after the confinement which is the critical period for mother and infant. This is not the place for discussion of the relative advantages of the individual estate hospital and the group hospital, but the women can in many cases be induced to come to the former for delivery.

Only a limited number of post-mortem examinations can be performed at the hospital and there are no facilities on the spot for detailed pathological and bacteriological examinations.

Past reproductive histories.—Table II gives the past reproductive histories of 826 pregnant women observed to the end of pregnancy over the five-year period under review. Women going through two pregnancies during this period are included once only. The histories are classified according to the result of the pregnancy under consideration, i.e., live birth, still-birth or abortion. In group B are included the histories given by 131 women from three estates which, for practical purposes, may be considered as non-malarious, the hospital malaria rate for the five-year period averaging 1.8 per cent per annum. In group C are included the histories given by 126 women from three estates which may be considered as moderately malarious, the hospital malaria rate averaging 12.1 per cent per annum. Both of these groups are included also in group A. The hospital malaria rate in group B is identical with the true malaria rate as all cases of malaria from these estates would be

(FRONT)

ANTE-NATAL AND INFANT WELFARE CARD

No. _____ Lines _____ Estate _____

Date first seen

Name	Husband's Name	Age	Race	Caste
------	----------------	-----	------	-------

On Estate	years	from India	years	Prev. res.
-----------	-------	------------	-------	------------

Mths. pregnant	Event	Date of event
----------------	-------	---------------

P. H. Married years V.D.

Fever

PREVIOUS PREGNANCIES

(Age, sex, size and health of child: labour: abortion, miscarriage:

C. L. M. puerperium: breast-feeding, etc.)

1.

2.

3.

4.

5.

6

2.

5.

(BACK)

PRESENT PREGNANCY.

Pelvis.	Inter sp.	ins.	Inter crist.	ins.	True conj.	ins.	Ht.	ins.
---------	-----------	------	--------------	------	------------	------	-----	------

Labour

Puerperium

Remarks

Date _____

Hg, %

Spleen

Oedema

Wt. lbs.

Albumen

B.P.

Vomiting

Blood

Stools

Uterus cm.

CHILD. Name

Sex

Date of birth

Weight at birth

lbs. Diet

Date _____

Weight lbs.

Remarks

sent to hospital. The hospital malaria rate for group C is rather less than the true malaria rate, as a few mild cases and relapses would be treated on the estates. Unfortunately there was considerable fluctuation in the populations of the estates included in these groups; that of group B varied between 888 in 1930 and 586 in 1933: that of group C between 1,114 in 1929 and 512 in 1932.

Some allowance must be made for the illiteracy of the coolie but the figures in table II have been collected with care and are given for purposes of comparison.

As one would expect, the still-birth and abortion rate is higher in all groups among those women whose present pregnancy ended in a still-birth or abortion than among those whose present pregnancy ended in a live birth.

Clinically, the writer has gained the impression that death of the foetus often occurs in subjects of malaria, even when there is no evidence that the infection has been active for any considerable time.

We find then 12 per cent of observed pregnancies ending in still-birth or abortion, and a

TABLE II

Past reproductive histories classified according to result of pregnancy under consideration

Result of pregnancy under consideration	WOMEN OBSERVED		PREVIOUS CHILDREN		PREVIOUS CHILDREN ALIVE		PREVIOUS STILL-BIRTHS OR ABORTIONS	
	Number	Per cent	Number	Children per woman	Number	Per cent	Number	Per cent of total previous pregnancies
Group A. All estates								
Live births ..	729	88	1,371	1.88	842	61	86	6.3
Still-births or abortions ..	97	12	179	1.85	84	47	26	12.7
TOTALS ..	826	..	1,550	1.88	926	60	112	6.7
Group B. Non-malarious estates								
Live births ..	124	95	274	2.23	174	64	5	1.8
Still-births or abortions ..	7	5	29	4.14	14	48	2	6.4
TOTALS ..	131	..	303	2.31	188	62	7	2.3
Group C. Malarious estates								
Live births ..	105	83	261	2.49	108	41	11	4.0
Still-births or abortions ..	21	17	41	1.95	21	51	2	4.6
TOTALS ..	126	..	302	2.40	129	43	13	4.1

Table II shows a combined still-birth and abortion rate, for the pregnancies under consideration, varying from 5 per cent in group B to 17 per cent in group C, the percentage for the 826 women observed being 12. The contrast is not so marked in the case of previous histories of still-birth and abortion, the rate being higher (6.7 per cent) in group A than in group C (4.1 per cent), though very low in group B (2.3 per cent). The explanation of this is probably to be found in the history of the malaria on the estates of group C. Figures are not available but, apart from minor outbreaks, endemic malaria did not occur until after the year 1919, the peak period being about 1926. The invasion of malaria is attributed to interference with drainage by the building of a railway and by the silting up of the coast line.

history of 6.7 per cent of previous pregnancies ending in the same way. These figures are low compared with a history of 14.3 to 18.99 per cent of previous pregnancies ending in abortion only, in groups of hospital cases in various parts of England from 1845 to 1913. These figures are quoted by Feldman (1927).

It is worthy of note that, in the above table, the number of children per woman is 2.40 in group C, 2.31 in group B and 1.88 in group A. The average birth rate for the five-year period is however 36.2 for group C, 59.3 for group B and 48.4 for group A. This would appear to indicate that endemic malaria of moderate intensity has a gradually cumulative effect on fertility. The percentage of children surviving at a given time is seen to be 62 in group B, 43 in group C and 60 in group A.

TABLE III
Results obtained over the five-year period, 1929—33

	Maternal deaths	Maternal mortality per 1,000 live births	Live births	Abortions	Still-births	Percentage of conceptions terminating in abortion or still-birth	Infant deaths	INFANT MORTALITY		Neo-natal deaths	NEO-NATAL MORTALITY	
								Crude	Corrected		Crude	Corrected
1929 ..	9	38.3	235	(17)	(6)	(8.9)	54	230	..	28	119	..
1930 ..	5	19.2	261	33	9	13.9	41	157	162	18	69	71
1931 ..	6	27.3	216	22	9	12.6	44	204	192	27	125	119
1932 ..	8	46.2	173	11	9	10.4	35	202	182	25	145	136
1933 ..	3	18.6	161	8	14	12.0	25	155	152	15	107	91
TOTAL	31	29.6	1,046	91	47	11.7	199	190	..	113	108	..
Total, 1930—33.	22	27.1	811	74	41	12.4	145	179	174	85	106	102

The figures in table III referring to still-births and abortions are not accurate for the year 1928. They refer almost entirely to those taking place in the hospital, as the system of notification had not been elaborated. It is possible that a few early abortions may have been missed in the later years also.

Maternal morbidity and mortality.—It may be stated at once that the type of case which the ante-natal work was primarily designed to prevent was the woman with profound anæmia and œdema, who usually either aborts or gives birth to a still-born child or a child who is weakly and likely to die shortly after birth. The cause of such a condition in the mother is usually malaria, dysentery or syphilis or a combination of two or more of these diseases. Ankylostomiasis also plays a part, but in spite of primitive sanitation, only some 15 per cent of cases admitted to hospital for all causes were found by simple slide examination to be infested

with hookworms. There is no doubt also a nutritional element in the majority of these cases, and in some no obvious cause for the condition can be found. In this type of case the woman herself commonly survives but becomes a chronic invalid and a heavy expense to her relatives and to her employers for many months.

One would indeed expect ante-natal work in this country to act more beneficially on the infant by way of the mother than in England. Though the fœtus will gain its nourishment at the expense of the mother, women in the condition described above cannot produce such healthy children as normal women.

That some success has been achieved in preventing this type of case is shown in table IV. For the purpose of these observations cases are considered to be anæmic when the hæmoglobin reading on the Tallqvist scale is 50 per cent or less at any period of the pregnancy.

TABLE IV
Anæmia among pregnant women, and maternal deaths

Apparent cause of anæmia				1929	1930	1931	1932	1933	TOTAL
Malaria ..	..	..	..	11	22	11	5	3	52
Malaria and syphilis ..	..	..	..	6	2	1	1	..	10
Syphilis ..	..	..	..	4	2	1	2	..	9
Helminthiasis ..	..	..	..	..	..	5	1	4	10
Amœbic dysentery ..	..	..	..	..	..	..	1	2	3
No obvious cause ..	..	..	..	7	8	2	2	..	19
TOTAL ..				28	34	20	12	9	103
Cases per cent of live births ..				11.9	13.0	9.3	6.9	5.6	9.9
Maternal deaths ..				5	2	2	1	1	11

Of the 41 cases occurring in the years 1931 to 1933, one woman died undelivered and 12 had still-births or abortions, 29.2 per cent of conceptions thus terminating. Of 29 living children, seven or 24.1 per cent died. The average birth weight of ten of these children was 4.5 pounds against an average of 5.3 pounds for 50 unselected new-born infants.

There are no facilities for detailed blood examinations but the impression gained clinically is that true pernicious anæmia of pregnancy is rare, and the majority of cases appear to be of the secondary, microcytic, hypochromic type usually responding with greater or less rapidity to treatment of the primary cause and, in addition, massive doses of iron and, in some cases, marmite. In some cases the hæmoglobin percentage may oscillate very rapidly from month to month, and in a few there is a very rapid fall shortly after delivery.

For ankylostomiasis, oil of chenopodium is given in three doses of five minims each at hourly intervals. Pregnant women tolerate this dosage well. Atebrin is given for malaria with good results. Syphilis is discussed later.

The maternal mortality rate is undoubtedly high but many of the deaths occurred several weeks after childbirth and could not be attributed solely to it. In many cases death was due to several co-existing diseases. According to Briere-Lefebvre (1933) the maternal mortality rate for Ceylon in 1932 was 19.2 for the whole island, 31.3 for the urban areas. Luddington (1933) states that for Indian labourers on estates in Ceylon the rate was 20.4 in 1931, 17.2 in 1932. This rate is reported to have been declining somewhat rapidly since 1930 and is said to refer to mothers dying at childbirth. The maternal mortality rate for the group of estates under consideration for the five-year period was 29.6 with a maximum of 46.2 in 1932 and a minimum of 18.6 in 1933. The causes of the maternal deaths were as follows:—

Malaria and complications	..	..	9
Puerperal sepsis	..	..	8
Dysentery and anæmia	..	..	2
Dysentery and sepsis	..	..	3
Post-partum hæmorrhage	..	..	2
Acute diarrhoea	..	..	2
Hemiplegia	..	..	1
Nephritis	..	..	1
Cirrhosis of liver	..	..	1
Rupture of Cæsarean scar	..	..	1
Hyperemesis gravidarum	..	..	1

TOTAL 31

Labour is usually easy and malpresentations are not common. During the five years 64 cases were admitted during labour. These included: delayed labour and uterine inertia, 43; retained placenta, 5; eclampsia, 6; contracted pelvis, 3; transverse presentation, 2; malaria, 2; œdema, amœbic dysentery and bronchopneumonia, 1 each. In addition 125 patients were admitted in the ante-natal period, and 41

in the post-natal, making a total of 230 or 21 per cent of the women observed. Outpatient treatment was given to 164 women.

The average pelvic measurements of 100 women were: interspinous diameter 8.6 inches; intereristal diameter, 9.5 inches; difference, 0.9 inches. The average birth weight of 50 infants was 5.3 pounds.

Abortions, still-births and neo-natal deaths.—The term abortion is taken to mean the expulsion of a dead foetus at any time before the twenty-eighth week of pregnancy; the term still-birth means the expulsion of a dead foetus after this time; and the term neo-natal death means death of the infant before the age of four weeks. It is difficult in many cases to be certain of the exact period of gestation in these women, so that a few abortions and still-births may be wrongly classified.

Table III shows that the annual abortion rate has considerably decreased while the still-birth rate has actually increased. Further work will be needed before the tendency of the neo-natal and infant mortality rates can be clearly defined. The still-birth rate in Ceylon has also remained high while the infant and maternal mortality rates have shown a tendency to come down.

Multiple births.—Mention may be made here of the appalling mortality experienced among multiple births. Out of nine sets of twins and one set of triplets, a total of twenty-one individuals, occurring in the five-year period, there were two still-births, sixteen neo-natal deaths and two infant deaths, only one individual surviving. Although the mortality among twins is always higher than among single births, this experience must have been peculiarly unfortunate as twins are not uncommonly met with among estate populations.

Consideration of table V and the chart following it justifies the following deductions. The infant mortality rate of the group of estates is high compared to the ante-natal mortality which itself compares well with that of western countries, especially in the case of abortions. Even the still-birth rate of the group of estates compares well with that of the urban areas of Ceylon and with that of Indian mill-workers. In this connection the fact that the still-birth rate of mill-workers is nearly double that of the wives of workers is worthy of notice. Many estate coolies cease work two months before delivery is expected and very few work during the last month of pregnancy. Special attention has not been given to this point, and, although the work of estate coolies is probably of a more healthy nature than that of mill-workers, being almost entirely out of doors and not very strenuous, the matter is one that should be kept in view and the date on which the woman ceases work should be noted on the ante-natal card.

The proportion of infant mortality to total mortality is high in the group of estates, as is

TABLE V

Some comparative statistics referring to abortion, still-births, and neo-natal and infant mortality

Subject	Group of estates	Figures for comparison	Authority for figures for comparison
Ratio of ante-natal to infant deaths	1 : 1.3		
In western countries		3 : 1	Feldman (1927).
Fœtal mortality per 1,000 live births		218	Feldman (1927).
1930-33	142		
Percentage of conceptions terminating in premature death of fœtus—			
In western countries		15	Ballantyne (1922).
1930-33	12.4		
Ratio of abortions to still-births—			
In western countries		4 : 1	Amand Routh (1914).
1930-33	1.8 : 1		
Still-births per 100 live births—			
County Boroughs, England and Wales, 1912 ..		2.98	
Do. range, 1910-12 ..		1.08-5.42	
Indian mill-workers—			
Workers		17.8	Balfour and Talpade (1930).
Wives of Indian mill-workers		9.8	
Ceylon, urban areas, 1932		7.7	Briercliffe (1933).
1930-33	5.1		
Proportion per cent of neo-natal deaths to infant deaths—			
France		33.3	Brend (1918).
England and Wales, 1921		42.6	Feldman (1927).
Do. 1927		32	Balfour (1930).
India, 1927		49.5	Balfour (1930).
Ceylon, 36 towns, 1932		53.4	Turner (1933).
1929-33	56.8		
Proportion per cent of infant mortality to general mortality—			
England and Wales, 1927		9	Balfour (1930).
India, 1927		23.7	Balfour (1930).
Ceylon, 1932		29.2	Turner (1933).
1929-33	41.7		

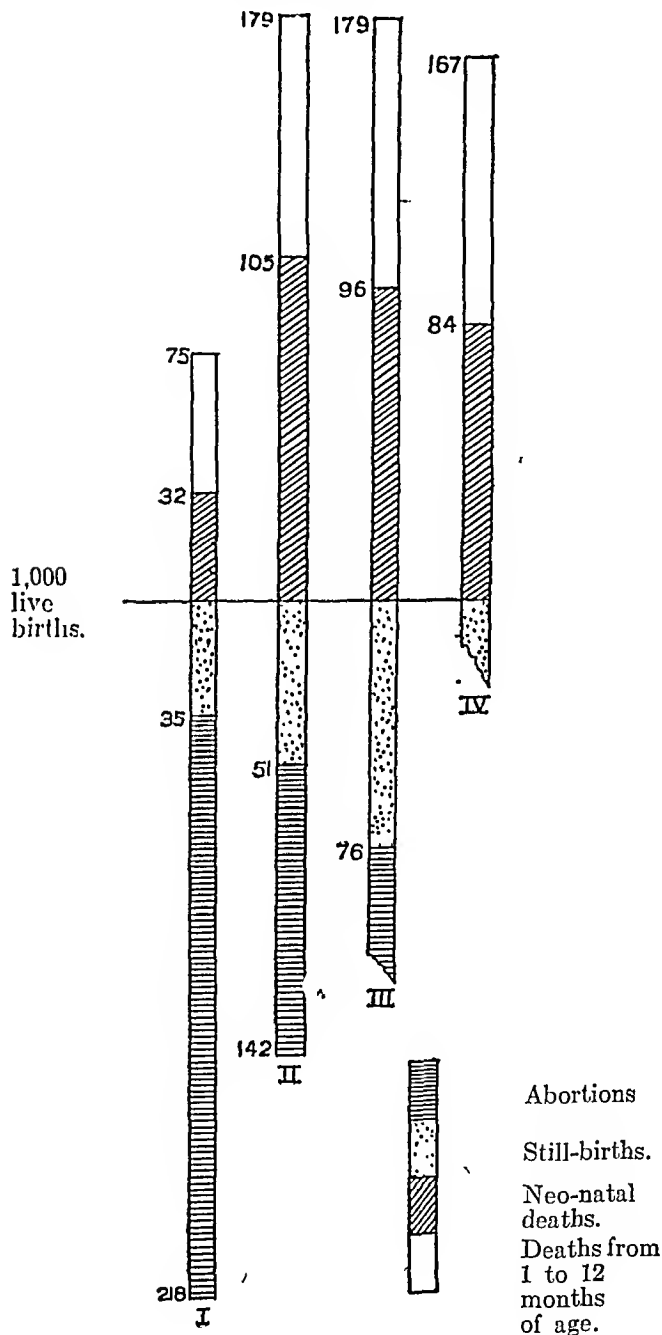
the proportion of neo-natal mortality to total infant mortality. In both cases the proportion tends to be higher in eastern countries than in the west, but in both cases the proportion recorded for the group of estates is high even for eastern countries.

Arthur Robinson quoted by Feldman (1927) estimates that inherent defects in ovum or spermatozoon are responsible for 40 per cent of total prenatal fetal mortality in human beings. This factor might be expected to act mainly during the earlier months of gestation and in many cases the condition would be described clinically as sterility. There is no evidence that this factor plays any disproportionate part among the race and castes with which this paper is concerned.

Table VI shows abortions, still-births and neo-natal deaths classified, so far as possible, according to their primary causes. Under the

heading 'syphilis' have been included group I, cases with Wassermann and Kahn reactions positive and group II, cases with Wassermann and Kahn reactions doubtful or disagreeing. These groups are referred to again when table VIII is discussed. It has not been possible to find any group of figures strictly comparable to those of table VI, but in table VII the percentages of still-births and neo-natal deaths have been compared with certain groups of figures quoted by Christine Thomson (1930) in her paper, *Still-birth and Neo-natal Death in India: A Preliminary Enquiry*. The writer is greatly indebted to this work. Thomson states that this is a field of enquiry which is virtually unexplored, and indeed her work must be a model for future investigators. Unfortunately it was not published until some time after the work here recorded was commenced, nor was it immediately available to the writer.

Chart to show comparative numbers of abortions, still-births, neo-natal deaths and infant deaths per 1,000 live births in:—I. Western countries; II. The group of estates under consideration, 1930–33; III. Thirty-six towns of Ceylon, 1932; IV. India, 1927. Column I is of a composite nature, the figures below the line being from an estimate calculated by Feldman, those above being the figures for England and Wales in 1925. The full figures for the towns of Ceylon and for India are not available.



The figures in column 2 of table VII refer to a series of 200 post-mortem examinations of urban hospital cases. The cases are not consecutive and still-births largely predominate, numbering 169, 85 being macerated, while 153 of the 200 cases were premature, post-mortem examinations on very premature foetuses being more readily obtained than those on full-term children. The figures in column 3 are from part II of Christine Thomson's paper, which refers to an All-India Questionnaire. From this the writer has abstracted the figures referring

to 979 urban hospital cases from Madras, the Presidency from which come the majority of the workers on the group of estates under consideration. Thomson states that, in the absence of detailed pathological and clinical data, figures referring to syphilis will be an under-estimate and those referring to prematurity *per se* and to neo-natal disease must be scientifically unreliable. In this Madras series there were 622 still-births, 138 being macerated, and 355 neo-natal deaths: in two cases the condition was not stated. In table VII the writer has transferred the item 'complications of labour. Normal labour (cause unknown)' to the heading 'cause unknown'. The figures in column 4 are from a series of 1,311 cases, an average for five British cities, examined by Holland and Lanc-Clayton (1926). The heading 'post-natal causes' has, for various reasons, been omitted by these authors, although neo-natal cases dying from other primary causes are included.

Consideration of table VI shows that in the group of estates malaria, anaemia and syphilis are the most common causes of abortion. There has been a considerable reduction in all these diseases in the later years of the period under consideration. Malaria also figures largely as a cause of still-birth while neo-natal states are the most important cause of neo-natal deaths. It must be remembered that but few post-mortem examinations could be made and therefore complete accuracy cannot be claimed for the figures of table VI. Browne (1922) has called attention to the frequency of cerebral haemorrhage among premature infants even when delivery is easy; also to the fact that an infant at birth may be suffering from advanced pneumonia, a common cause of post-natal death. An acute haemorrhagic form of pneumonia may cause sudden death.

Table VII shows the figure for the group of estates for the complications of labour to be very low. The figure 25.3 per cent for this cause for Madras is the lowest in the total of 3,708 cases from all India, the figure amounting to 50 to 60 per cent or more for cities in northern India where osteomalacia is common. The writer has found accidental haemorrhage and placenta praevia to be uncommon and could attribute no death to these conditions. The figures for the group of estates for syphilis, prematurity *per se* and neo-natal disease are all high while that for toxæmia of pregnancy is low. No deaths could be attributed to congenital malformations or foetal disease.

Nutrition.—One cannot escape the impression that malnutrition of the mother is the underlying factor in many cases of premature birth and foetal and neo-natal death. The Tamil dietary is deficient in vitamin A, in fat and in animal protein. Xerosis, nyctalopia and pyorrhea are all found not uncommonly, though it

TABLE VI

Abortions, still-births and neo-natal deaths classified according to primary causes

	I ABORTIONS		II STILL-BIRTHS		III NEO-NATAL DEATHS		II AND III		I, II AND III	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
Complications of labour ..	..	..	9	22.0	..	..	9	7.1	9	..
Toxæmias of pregnancy ..	3	4.1	3	7.3	1	1.2	4	3.2	7	..
Syphilis ..	..	19.5	..	12.2	..	21.2	..	18.3	..	15.0
Group I ..	2	..	..	..	6	..	6	..	8	..
Group II ..	5	..	5	..	12	..	17	..	22	..
Acute maternal disease ..	34	45.9	14	34.1	1	1.2	15	11.9	49	24.5
Malaria ..	16	21.6	13	31.7	1	1.2	14	11.1	30	15.0
Anæmia ..	16	21.6	..	..	..	..	..	..	16	8.0
Pneumonia ..	1	1.4	..	..	..	..	..	..	1	0.5
Dysentery ..	1	1.4	1	2.4	..	..	1	0.8	2	1.0
Fœtal states ..	..	2.7	..	..	..	..	..	..	..	..
Vesicular mole ..	2	..	..	..	..	..	..	..	..	..
Prematurity <i>per se</i> ..	..	..	..	..	18	21.2	18	14.3	18	..
Neo-natal states ..	..	..	..	..	29	34.1	29	23.0	29	..
Pemphigus ..	..	..	..	..	2	2.4	..	..	..	..
Tetanus ..	..	..	..	..	5	5.9	..	..	..	..
Asphyxia ..	..	..	..	..	2	2.4	..	..	..	..
Hæmorrhage ..	..	..	..	..	5	5.9	..	..	..	..
Pneumonia ..	..	..	..	..	8	9.4	..	..	..	..
Septicæmia ..	..	..	..	..	1	1.2	..	..	..	..
Marasmus ..	..	..	..	..	6	7.0	..	..	..	..
Unknown (including con- vulsions).	30	40.5	10	24.4	18	21.2	28	22.2	58	29.0
TOTAL ..	74	..	41	..	85	..	126	..	200	..

TABLE VII

Percentage of still-births and neo-natal deaths classified according to primary causes, with figures for comparison from series examined by Christine Thomson and by Holland and Lane-Clayton

Cause of still-birth or neo-natal death	Group of estates 1	C. Thomson post-mortems 2	Madras 3	Holland and Lane-Clayton 4
Complications of labour ..	7.1	19.5	25.3	34.8
Ante-partum hæmorrhage ..	..	13.5	10.4	18.9
Toxæmias of pregnancy ..	3.2	15.5	13.2	12.3
Syphilis ..	18.3	16.5	1.3	8.6
Maternal states ..	11.9	13.0	16.3	2.6
Fœtal states ..	..	8.0	2.6	10.3
Prematurity <i>per se</i> ..	14.3	3.5	12.7	3.2
Neo-natal states ..	23.0	2.0	2.4	..
Placental disease ..	..	5.5	..	1.0
Unknown ..	22.2	3.0	10.5	8.3

cannot be said that they are specially common among pregnant women.

The strain of the later months of pregnancy seems to render the mother highly susceptible and more vulnerable to common tropical diseases

such as malaria and amœbic dysentery, which often become manifest shortly before or after delivery. Malnutrition also appears to play a large part in the causation of anæmia and œdema. True beri-beri is almost unknown

among these women, but œdema is very common with any debilitating disease such as malaria or amœbic dysentery. It may occur in the absence of such diseases and may or may not be associated with anæmia. Œdema of the vulva and deeper tissues favours difficult labour, perineal tears and local sepsis. The treatment of œdema may prove very difficult. The dividing line between œdema of nutritional origin and that of nephritic or toxæmic origin does not appear to be clearly defined. Cases have been observed of œdema without albuminuria in the later months of pregnancy, in which albuminuria appeared for the first time during or shortly after labour. Treatment of the underlying disease, if any, combined with the administration of alkalis and attention to diet and nutrition helps these cases but is not always entirely satisfactory.

Facts which support the impression that malnutrition of the mother plays an important part in foetal and neo-natal mortality are the low average birth weight (5.3 pounds) of infants, and the very heavy mortality among multiple conceptions which must throw an added strain on the mother. Deficiency of fat in the maternal diet will tend to the production of children of low birth weight. It has been established by Margaret Balfour (1930) that the death rate in the first three months of life is very much higher when the birth weight is low, being 62 per thousand for babies with birth weight of 5 to 5½ pounds, 333 for those with birth weight of 4 to 5 pounds, and 840 for those with birth weight below 4 pounds.

An attempt was made to estimate the state of nutrition of a number of women by the *pelidisi*, an index of nutrition calculated from a formula involving the weight, the sitting height and the estimated intestinal area. Such an index cannot of course be applied to pregnant women. An index of 90 is said to indicate a low state of nutrition, an index of 100 a normal state of nutrition and an index of over 100 and up to 113 a fat person. The index was calculated for 41 apparently healthy women. The average *pelidisi* was 98, maximum 107, minimum

88. The average weight of the same women was 88 pounds, maximum 110 pounds, minimum 68 pounds. For any definite conclusions to be drawn it would be necessary to calculate the nutritional index before or after pregnancy of large comparable groups of women who had on the one hand normal infants and on the other abortions, still-births or premature or sickly infants.

According to Wills and Talpade (1930) working in Bombay, lack of vitamin B in the maternal diet may cause the birth of premature infants. Deficiency of vitamin E (similar in constitution and physical properties to vitamin A) by leading to inherent weakness in the germ cells is said to be a factor in the causation of premature births as well as early abortions. McCarrison (1929) states that deficiency of vitamin A in the mother's diet may be a cause of infant mortality by causing weakness of the child at birth. Hypothyroidism associated with low blood pressure is said to predispose to still-birth by favouring the onset of toxic conditions. In some cases habitual abortion is said to be connected with increased venous pressure which may be treated by intermittent digitalization and administration of pituitary extract and subsequent oral calcium. For recurrent abortion a diet is indicated which is rich in vitamin E with the addition of iodine, calcium and possibly corpus luteum. For this condition potassium iodide in minute doses with Bland's pill has been advocated even if the Wassermann reaction is negative. For repeated still-births ten grains of calcium lactate twice daily from the sixth month of pregnancy has been advised and the writer has used this treatment in a few cases.

Syphilis.—Frank syphilis of either the congenital or acquired variety is not common among the estate population. However it appeared desirable to investigate the prevalence of the disease and, through the kindness of the Director of the Institute for Medical Research, Kuala Lumpur, it was possible to have a number of Wassermann and Kahn tests carried out. The results of this investigation are given in table VIII. These cases must be regarded as

TABLE VIII
Results of Wassermann and Kahn reactions, and past reproductive histories, 1929—33

Groups	Number of women	Per cent of total	PREVIOUS CHILDREN		PREVIOUS CHILDREN ALIVE		PREVIOUS STILL-BIRTHS OR ABORTIONS	
			Number	Children per woman	Number	Per cent of previous children	Number	Per cent of total previous pregnancies
Group I, W. and K. positive	40	23	61	1.53	21	34	25	29
Group II, W. and K. doubtful or disagreeing.	43	24	75	1.74	21	28	20	21
Groups I and II ..	83	47	136	1.64	42	31	45	25
Group III, W. and K. negative	94	53	214	2.28	91	43	44	17
TOTALS ..	177	..	350	1.98	133	38	89	20

selected and the chief reasons for which the tests were carried out were, a pregnancy ending in still-birth or abortion or a history of such, neo-natal deaths or a history of such, a family history of syphilis, and in a few cases anaemia not responding to ordinary methods of treatment. In some cases the tests were not made until after the termination of the pregnancy under consideration. Women who went through more than one pregnancy during the five-year period or who had their blood tested on more than one occasion are included once only in these tables.

Group II, Wassermann and Kahn reactions doubtful or disagreeing, is made up as follows:—

W. ++, K. —	, 1	W. ±, K. —	, 12
W. +, K. ±	, 4	W. —, K. +	, 2
W. +, K. —	, 3	W. —, K. ±	, 3
W. ±, K. ++	, 2	Others	1
W. ±, K. +	, 2		
W. ±, K. ±	, 13	Total	43

There is little doubt that the great majority of cases in this group are syphilitic.

On comparing table VIII with table II, taking groups I and II of table VIII together, we find that 83 selected cases out of a total of 826 women or 10 per cent had serological evidence of syphilis. The percentage of still-births and abortions in past histories is much higher in all groups in table VIII than in table II, being 25 per cent in groups I and II and 17 per cent in group III of table VIII. The percentage of children surviving at a given time is low in table VIII, being 31 per cent in groups I and II and 43 per cent in group III, against 60 per cent of those born to the whole number of 826 women.

Table IX shows the results of the pregnancies undergone by these 177 women during the five-year period under review.

those without. There are more of both abortions and still-births in the group of cases with negative Wassermann and Kahn reactions. Contrary to what would be expected, the number of abortions is greater in all groups than the number of still-births. The neo-natal mortality is however much higher in the group with evidence of syphilis. In this connection the effects of treatment must be considered, and also the fact that even the case with negative Wassermann and Kahn reactions had for the most part been selected on account of a history of still-births or abortions. The infant mortality, high in all groups, is much higher in the group with evidence of syphilis, in spite of treatment. Treatment would appear to be more effective in preventing still-births and abortions than in preventing neo-natal deaths.

The results of treatment are analysed in table X. The first results with intravenous arsenicals were unfortunate. Of the first two cases, one aborted on the day following the first injection and the other died a few days after an injection, with signs and post-mortem findings suggesting encephalitis hæmorrhagica. This naturally prejudiced the women and a trial was made of a method similar to that advocated by Dr. and Mrs. A. R. Cook (1929) in Uganda. A mixture containing a thirty-second of a grain of mercury perchloride and a sixty-fourth of a grain of methylene blue in an ounce of water was given twice daily for as long a period of the pregnancy as possible. Dr. and Mrs. Cook found that in Uganda few women showed active signs of syphilis, while abortions, still-births, and congenital syphilites were very common. Many women who had had a long series of miscarriages bore healthy children for the first time after a course of this 'blue mixture', often given throughout pregnancy. If the mother showed signs of active syphilis, one

TABLE IX

Results of pregnancies classified according to results of Wassermann and Kahn reactions

	Num- ber of women	Live births	Abor- tions	STILL-BIRTHS		Per cent conceptions ending in still-births or abortions	INFANT MORTALITY		NEO-NATAL MORTALITY	
				Num- ber	Per 100 live births		Num- ber	Rate	Num- ber	Rate
Group I, W. and K. positive.	40	33	6	1	3.0	17	15	455	11	333
Group II, W. and K. doubtful.	43	34	5	4	11.8	21	15	442	15	442
Groups I and II ..	83	67	11	5	7.4	19	30	448	26	388
Group III, W. and K. negative.	94	67	15	12	17.6	29	23	343	15	223
TOTALS ..	177	134	26	17	12.7	24	53	396	41	306

Table IX shows the foetal mortality to be lower in cases with evidence of syphilis than in

or two salvarsan substitute injections were given in addition. The results obtained with this

treatment on the group of estates were also encouraging; the mixture costs practically nothing and is surprisingly popular among the coolies, the blue colour apparently attracting them. Later, treatment with arsenicals was cautiously resumed, blue mixture being often given as well. Intramuscular stabilarsan was used on occasion and the present policy is to give a minimum of three injections of stabilarsan, with blue mixture for as long as possible. In some cases bismuth or mercury is given in addition. Great caution is certainly necessary in the administration of intravenous arsenicals to pregnant Tamil coolie women.

In table X, group I includes cases treated with at least three injections of arsenicals, with or without mercury, bismuth or blue mixture in addition. In some cases it was possible to give six injections of arsenicals. Group II includes cases treated with blue mixture alone for three months or more. Group III includes all cases who either received no treatment at all, often because the blood was not tested until after the termination of the pregnancy, or less than three injections of arsenicals and/or less than three months' treatment with blue mixture. This group is considered to have received no treatment. Table X includes the cases of groups I and II of tables VIII and IX.

The figures in this table are certainly small, especially in group II, but they are definitely in

Table XI includes the number of deaths, the percentage of the total number of deaths and the mortality per 1,000 live births for each age group for each year. Some figures for England and Wales for 1921 and for the U. S. A. for 1919 are included for comparison. In the case of England and Wales the percentage of the total number of deaths and the mortality per 1,000 live births is given for each age group; in the case of U. S. A. only the mortality per 1,000 live births.

Table XI shows a very high mortality rate for the group of estates for the first day, week and month of infant life, especially the latter. The mortality for these three periods of infant life is especially low in the two years 1930 and 1933 in which the total infant mortality is low. The probable effect of malnutrition of the mother on early neo-natal mortality has already been discussed. There is a definite tendency for the mortality rate to come down in the latter age periods, three to six and six to twelve months. This is the usual experience in infant welfare work.

Table XII is concerned with the final causes of infant mortality and this explains why only three deaths are attributed to syphilis. The chief causes of death are seen to be developmental conditions and the miscellaneous group 'other conditions', among which convulsions

TABLE X

Results of treatment of pregnant women with evidence of syphilis

Result of pregnancy	GROUP I		GROUP II		GROUP III		TOTALS	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Abortions ..	1	4.8	0	0.0	10	20.4	11	13.3
Still-births ..	1	4.8	1	7.7	3	6.1	5	6.0
Neo-natal deaths ..	6	28.6	2	15.4	13	26.5	21	25.3
Total infant deaths ..	7	33.3	3	23.1	20	40.8	30	26.1
Survived ..	12	57.2	9	69.2	16	32.7	37	44.6
Totals ..	21	..	13	..	49	..	83	..
Percentage ..	25.3	..	15.7	..	59.0	..	..	..

favour of those receiving treatment, and the results with blue mixture appear to be better than those with arsenical injections. The opinion gained is that blue mixture is definitely of value and that there is justification for persisting in its use.

In a very few cases it is possible that children may have left their estate and died subsequently, but the great majority were kept under observation.

Infant mortality is classified in table XI by age groups, and in table XII by diseases and disease groups.

bulk large. The majority of deaths from developmental conditions are dependent on ante-natal influences of which malnutrition of the mother is probably the most important. The mortality for developmental conditions is considerably lower in 1933 than in any other year. There is a definite tendency for the mortality to come down in the group 'other conditions'. The mortality from bowel diseases is low, probably because the great majority of infants are still breast-fed. In western countries the greatest reduction in infant mortality is found in diseases of the digestive system and in

TABLE XI

Number of infant deaths, percentage of total infant deaths and infant mortality rate classified by age groups

Year, etc.	0 to 1 day	1 to 7 days	Under 1 month	1 to 3 months	Total to 3 months	3 to 6 months	6 to 12 months	Deaths under 1 year	Infant mortality rate	Infant mortality rate, corrected
1929 ..	..	..	28	..	..	..	..	54	..	..
	..	..	51.9	..	No	..	..	..	..	..
	..	..	119	..	records	..	..	..	230	..
1930 ..	3	7	18	5	23	9	9	41	..	..
	7.3	17.1	43.9	12.2	56.1	22.0	22.0	..	..	162
	11	27	69	19	88	34	34	..	157	..
1931 ..	6	10	27	6	33	6	5	44	..	..
	13.6	22.7	61.4	13.6	75.0	13.6	11.4	..	..	..
	28	46	125	28	153	28	23	..	204	192
1932 ..	9	10	25	3	28	2	5	35	..	..
	25.7	28.6	71.2	8.6	80.0	5.7	14.3	..	..	..
	52	58	145	17	162	12	29	..	202	182
1933 ..	3	3	15	5	20	2	3	25	..	..
	12.0	12.0	60.0	20.0	80.0	8.0	12.0	..	..	..
	19	19	93	31	124	12	19	..	155	152
1930-33 ..	21	30	85	19	104	19	22	145	..	..
	14.5	20.7	58.6	13.1	71.7	13.1	15.2	..	..	..
	26	37	105	23	128	23	27	..	179	..
England and Wales, 1921.	13.0	14.1	42.6	17.9	60.5	16.9	22.5	..	..	..
	11	12	35	15	50	14	19	..	83	..
U. S. A., 1919.	15	14	42	13	55	14	18	..	87	..

convulsions which, according to Feldman, may also be caused by unsuitable or infected food.

Convulsions.—From experience of the limited number of post-mortem examinations on infants which it was possible to make, the writer is of the opinion that some cases of convulsions were due to bronchopneumonia which was found post mortem in a number of cases reported as dying from convulsions. In such cases the death was entered under the heading bronchopneumonia. This disease can at times kill with appalling rapidity. It is not uncommon to obtain a history that a child was bright, cheerful and feeding well in the morning and was dead by the afternoon, and to find typical bronchopneumonic patches in the lungs on post-mortem examination. This may also occur with older children. Some cases of convulsions were probably due to syphilis. Brownlee (1918) states that convulsions are a reflex phenomenon, due to a variety of intoxications, alimentary or otherwise, and that their occurrence is an index of the condition of the nervous system at each point of growth, the essential factor in their causation being nervous instability. Brownlee's opinion is that consideration of convulsions as a symptom rather than a disease is not justified. He states that the death rate from this cause decreases smoothly with age.

It is logical to deduce from tables XI and XII that attention to the condition of the mother before confinement is probably the most important factor in preventing infant mortality. Every effort must be made to build up her strength by inducing her to take a suitable diet and by supplementing it with such additions as can be made, such as milk and cod-liver oil. All cases who show signs of incipient disease, malnutrition or anemia must be admitted early to hospital. It is important also to ensure that facilities are provided for the mother to look after her child adequately on the estate, and to feed it at regular intervals. Regular examination of infants and their early admission to hospital if the weight does not increase satisfactorily will also save a number of lives.

Summary and conclusions.—Five years' ante-natal and infant welfare work on a group of rubber estates is recorded, complete figures being only available for the last four years. The writer is very conscious of the defects of this paper. Full scientific investigation of cases was not possible as the work was carried on without special staff, as part of the routine of estate practice. But estate practice does give the opportunity for continuous investigations on a population subject to a considerable degree of control, and these findings are put on record in

TABLE XII

Number of infant deaths, percentage of total infant deaths and infant mortality rate classified by disease and disease groups, for the years 1930—33

	1930	1931	1932	1933	Total 1930—33
Bronchitis	1	..	1	..	2
Bronchopneumonia	6	4	6	7	23
TOTAL RESPIRATORY DISEASES ..	7	4	7	7	25
Percentage of infant deaths	17.1	9.1	20.0	28.0	17.2
Infant mortality	27	19	40	43	31
Prematurity	6	10	5	4	25
Marasmus	9	4	5	3	21
Asphyxia .. .. .	..	..	1	1	2
TOTAL DEVELOPMENTAL CONDITIONS ..	15	14	11	8	48
Percentage of infant deaths	36.6	31.8	31.5	32.0	33.1
Infant mortality	57	65	64	50	59
Diarrhoea .. .. .	..	5	1	..	6
Amœbic dysentery .. .. .	..	..	1	..	1
TOTAL BOWEL DISEASES ..	..	5	2	..	7
Percentage of infant deaths .. .. .	..	11.4	5.7	..	4.8
Infant mortality .. .. .	..	23	12	..	9
Convulsions	13	11	10	5	39
Malaria	2	1	..	1	4
Hæmorrhage	2	3	..	..	5
Pemphigus	1	1	..	..	2
Tetanus .. .. .	..	2	1	2	5
Syphilis	1	1	1	..	3
Others and unknown .. .. .	..	2	3	2	7
TOTAL OTHER CONDITIONS ..	19	21	15	10	65
Percentage of infant deaths	46.3	47.7	42.9	40.0	44.8
Infant mortality	73	97	87	62	80
Total infant deaths	41	44	35	25	145
Infant mortality	157	204	202	155	179
Infant mortality corrected	162	192	182	152	..

the hope that others, perhaps more fortunately situated than the writer, may bring forward observations in a field that has been but little touched in the past, and which, if fully explored, cannot fail to yield information of practical value.

Certain deductions are justified. One of the most important is that endemic malaria, even of moderate intensity, plays a very large part in foetal mortality and maternal morbidity and,

less directly, in neo-natal mortality. This is made clear in many ways throughout the paper. The effect is much greater than would be made evident in the usual health statistics supplied by estates.

Maternal mortality is high, being largely due to intercurrent disease, but considerable success has been met with in the prevention of the anæmia so often met with in pregnant women of the class under consideration.

The abortion rate compares well with that of western countries, and a still-birth rate of 5.1 per 100 live births is a satisfactory figure for an eastern country. Malaria and anaemia are the most common causes of abortion, and syphilis is of importance in the causation of abortions as well as of still-births and neo-natal deaths. In comparison with western countries the proportion of still-births and neo-natal deaths that can be attributed to complications of labour, toxæmias of pregnancy and ante-partum hæmorrhage is low while neo-natal states bulk large in this respect.

Infant mortality is responsible for the large proportion of 41 per cent of the general mortality while neo-natal mortality accounts for no less than 56.8 per cent of infant mortality. The average weight of new-born infants is low, being 5.3 pounds, and, although it is difficult to prove statistically, there is much evidence to suggest that malnutrition of the mother is responsible for a large proportion of foetal and neo-natal mortality.

The results of the investigation of the Wassermann and Kahn reactions of a number of pregnant women are given and the relation of these to foetal and neo-natal mortality is discussed. The effect of treatment on these cases is analysed and some success with mercury perchloride by mouth is recorded, caution being necessary in the use of arsenicals.

Ante-natal influences are seen to have a large effect on infant mortality and many findings point to the great importance of care of the mother during pregnancy and labour. The difficulties incident on supervision of labour have not yet been surmounted.

It is difficult to make a final assessment of the value of the work since figures are small and the time period short and no figures are available for populations, otherwise comparable, among which no such work has been carried out. Nevertheless results have been sufficient to provide encouragement for continuation of the work.

Acknowledgments.—The writer wishes to record his gratitude to assistant surgeons A. Devasagayam and T. Mahadevan. Without the interest, skill and sympathy shown by the former in dealing with women of an uneducated class, the work could never have been initiated. The latter has carried on the work and has been of great assistance in collecting statistics. Thanks are indeed due to all the hospital and estate staffs for their ready co-operation and interest and to others for their advice and encouragement, especially to Dr. A. Neave Kingsbury, Director of the Institute for Medical Research, Kuala Lumpur, and the staff of the Institute who carried out the serological examinations.

(Continued at foot of next column)

INVESTIGATIONS ON CEREBRO-SPINAL FEVER IN NASIRABAD (RAJPUTANA) DURING THE PERIOD 1931 TO 1934

Part I

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I. Introduction

In this paper, I shall confine myself chiefly to the epidemiological and preventive rather than to the clinical aspect of cerebro-spinal fever, and describe the measures which resulted definitely in controlling the disease.

Cerebro-spinal fever is confined only to one unit stationed permanently at Nasirabad, i.e., the 10/6th Rajputana Rifles, which is a training

(Continued from previous column)

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battalion. The function of this unit is to procure new recruits, and to train them for a period varying from 9 to 12 months, before sending them away to the five active battalions of the group. Besides the recruits, the number of whom varies from 400 to 500, the battalion consists of a permanent staff of about 400 men employed as instructors, lecturers, clerks, schoolmasters and artificers, who remain in the station for a period of two years or more. The battalion, on an average, recruits 300 new men yearly from Jaipur, Jodhpur, Bikaner and other Rajputana States, and also one hundred men from the Punjab. In the Rajputana States, cerebro-spinal fever is known to be prevalent sporadically.

Cerebro-spinal fever was detected for the first time in Nasirabad in December 1927, when two cases were reported. Since then, there has been a gradual but very steady and perceptible rise, year by year, culminating in a local epidemic with 15 cases in 1930, nine of which occurred within one month.

TABLE I

Annual incidence of cases, since 1927

Year	Cases	Deaths	Case mortality
1927 ..	2	1	50 per cent
1928 ..	7	1	14 "
1929 ..	8	2	25 "
1930 ..	15	13	80 "
1931 ..	9	4	44 "
'Carrier' test on non-contacts commenced November 1931.			
1932 ..	1	1	75 per cent
1933 ..	4	3	
1934 ..	1	1	
TOTAL ..	47	26	55 per cent

The method adopted to control the fever from 1927 to October 1931 was to search for 'carriers' amongst the contacts of cases, after the fever made its appearance. When I took over the charge of the brigade laboratory at Nasirabad, in October 1931, after a review of the whole situation, I realized that little was being done bacteriologically to prevent the disease till actual cases of the fever appeared.

I, therefore, decided that to check the disease effectively and to prevent its recurrence, as many carriers as possible should be detected and isolated before the disease made its appearance. With this view, to begin with I decided to search for carriers in the permanent staff, who, having constantly to shout at, or lecture the recruits, were most likely to spread the disease. During this period, each individual

was examined to see if he were a carrier, for six consecutive days. Though the number of carriers identified and isolated from amongst this group of men was small, this method met with instantaneous success, as the case incidence dropped from 17 in the year 1930-31 before it was adopted to 2 in 1931-32, the following year.

The next step taken further to control the disease was to examine the entire battalion for carriers. This work was taken in hand from November 1932 to March 1933. It was soon apparent that if every man of the battalion was examined for six consecutive days, the time required, the labour entailed, and the cost of material would be enormous. Besides, with increasing experience and better organization, it was observed that it was possible to detect a large majority of carriers at one of the first three swab examinations. So after this, every man was examined thrice, and during the season 1933-34 this was further reduced to two examinations.

II. Mode of introduction of cerebro-spinal fever in 10/6th Rajputana Rifles at Nasirabad

No case of any form of meningitis has been recorded prior to 1927 in the troops stationed at Nasirabad, so it may be assumed that cerebro-spinal fever made its appearance for the first time in that year. The disease could only be introduced from one of the three following sources:—

- (1) From the civilian population of Nasirabad.
- (2) From the recruits entering the battalion.
- (3) From the permanent members of the staff of the battalion.

The first is very unlikely, as from 1927 to 1933 not a single case of meningitis has been seen in the Cantonment General Hospital at Nasirabad, which deals with about 60,000 cases per annum. Hence, the disease could only be introduced by either the recruits entering the battalion, or the permanent members of the staff of the battalion. This question, which had remained a moot point for years and was the cause of advancement of various theories for and against, was not finally settled till the completion of investigations carried out by me and my two assistants from November 1932 to March 1933.

To settle the problem once for all, a large number of men were examined to see if they were carriers amongst the members of the permanent staff of the battalion, and similar examinations were carried out among the recruits; and it was soon found that the percentage of carriers in the permanent staff was much higher than the percentage in the recruits. A recruit technically means a new entrant to the battalion up to a period of 9 to 12 months. Therefore, it was further necessary to isolate

the new entrants to the battalion, and to examine them within 10 days of their arrival at Nasirabad.

1. Three hundred and seventy-five recruits kept isolated and examined within 10 days of their arrival gave a carrier rate of 1.8 per cent.
2. Four hundred members of the permanent staff examined gave a carrier rate of 44 per cent.
3. Recruits leaving the battalion after a period of 9 to 12 months showed a carrier rate of 22 per cent.

Therefore, the natural conclusion derived from these investigations was to the effect that the disease was conveyed by means of carriers to the incoming recruits, from the permanent members of the staff of the battalion.

A few more facts may be mentioned which show that the disease could not be introduced by the recruits entering the battalion.

1. The disease, while occurring amongst the civilian population of the recruiting area of the battalion, is not prevalent to such an extent as to attract attention.

months after their arrival at Nasirabad, i.e., after they have come in contact with the permanent members of the staff who show a disproportionately higher carrier rate.

III. The mode of propagation of the disease within the unit

The above facts leave but scant doubt that the disease, having been introduced into the unit in 1927 for the first time, is kept up by carriers (permanent, temporary or intermittent) who mostly belong to the permanent staff, and to a lesser extent by the recruits who are infected later by the old carriers.

IV. Aetiology

1. Age

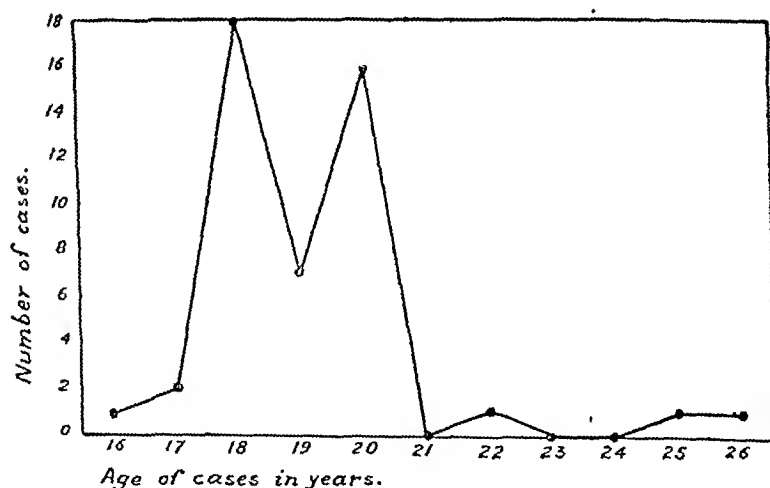
As the preponderating number of cases is amongst the recruits, the age incidence is naturally low; the youngest age being 16, the oldest 26, and the average 19.2.

2. Sex

The sex question arises only in so far as there are about 350 women and children residing

CHART I

Showing incidence of cases according to age period



Age	Number of cases
16	1
17	2
18	18
19	7
20	16
21	..
22	1
23	..
24	..
25	1
26	1
Total	47

2. As far as it is possible to ascertain, no similar outbreak of cerebro-spinal fever has occurred in other training battalions which recruit from the same area.
3. The incubation period of cerebro-spinal fever being from 3 to 10 days, it is but reasonable to expect that a few cases would occur in the recruits immediately on arrival at Nasirabad, but this has never happened. On the contrary, the disease in a large number of cases makes its appearance in recruits three

permanently in the unit family lines; no case has ever occurred in the families, though carriers were isolated from amongst the men of these lines, and the standard of spacing of beds in the families is not on such a generous scale as that of men in the regular barracks.

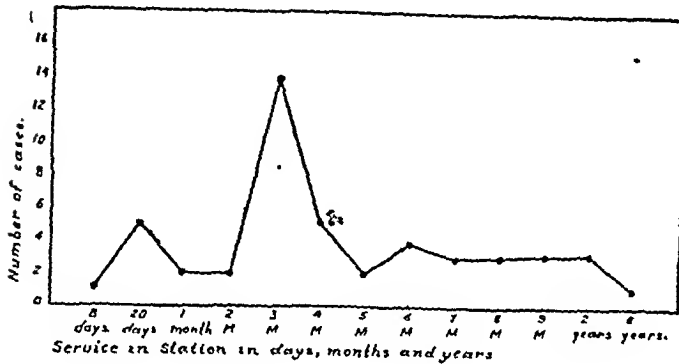
3. Length of service of cases in the station

By far the largest number (about 30 per cent) of cases occurred in the third month of the recruit's entrance into the army. It is considered that this is due to the fact that the third month is the most difficult and strenuous portion

of his training; this, no doubt, lowers his resistance to infection and also recruits enrolled during September and October have their most strenuous training period coinciding with the two most rigorous and trying months of the year (December and January) when a very large number of cases of nasal and respiratory diseases occur, which, as will be seen later, are associated with the incidence of cerebro-spinal fever (see chart V).

CHART II

Showing number of cases according to length of service in station



4. Susceptibility of various classes of men to disease

Of the total 47 cases, 38 (i.e., 80.8 per cent) occurred amongst the recruits, the remainder being shared by the followers and men of the permanent staff in the proportion of 12.8 and 6.4 per cent respectively.

This disproportionate number of cases amongst the recruits becomes more marked when it is considered that they harbour comparatively few carriers amongst them. The number of recruits affected with the fever is still further increased if five of the six followers, whose service in the battalion ranges from eight days to five months, are included amongst the recruits as they should be, in consideration of the shortness of their service. It is noteworthy that age and recent entrance into the battalion play an important part in the causation of disease at Nasirabad.

5. Seasonal incidence of cases

Saligman, in Prussia, finds the highest incidence of cases in the first half of the year, decreasing about the middle, and lowest in autumn and winter months. Thus his March records are highest and those of December lowest. In Nasirabad, however, cerebro-spinal fever is a disease of the winter and spring months, by far the greatest number of cases (82.8 per cent) occurring then; while the remaining 17.2 per cent, distributed in the summer seasons of 1929-30, 1933 and 1934, are more in the nature of exceptions than the rule.

TABLE II

Case incidence of 6-monthly period from November to April (winter and spring)

Season (Nov. to April)	Number of cases	82.8 per cent cases during winter months
1927-28 ..	5	
1928-29 ..	8	
1929-30 ..	3	
1930-31 ..	17	
1931-32 ..	2	
1932-33 ..	4	
1933-34 ..	Nil	
TOTAL ..	39	

TABLE III

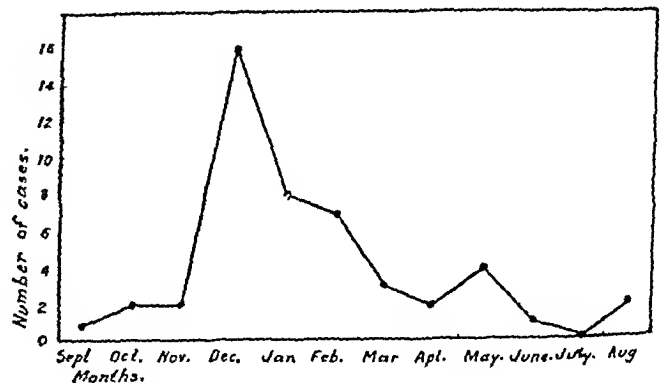
Incidence of cases from May to October (summer and monsoon)

Season (May to October)	Number of cases	17.2 per cent cases in summer and monsoon months.
1927 ..	Nil	
1928 ..	Nil	
1929 ..	4	
1930 ..	2	
1931 ..	Nil	
1932 ..	Nil	
1933 ..	1	
1934 ..	1	
TOTAL ..	8	

A perusal of tables II and III and chart III shows at once that, as opposed to Saligman's finding, our cases begin to occur between September and November, reach the peak between December and February, and begin to fall rapidly every month, finally ending in June, and that there is a definite lull in occurrence of cases between April and September; during this period very few carriers are found even after repeated throat-swab examinations.

CHART III

Showing monthly incidence of total cases from 1927 to 1934



This is quite in keeping with the observations of Fildes and Baker, who investigated the cerebro-spinal fever outbreak in the British Navy during the years 1916 and 1917. They observed their first case in October and the second in November. From this time onwards the cases increased almost weekly, reaching a climax about the end of February. After this date the number of cases declined to zero. They further record a smaller secondary rise in May and June. This also has occurred, to a lesser extent, in May at Nasirabad. Hence it will be apparent that seasonal incidence in this station approximates very closely with the English figures, as worked out by Fildes and Baker, and is opposed to Saligman's findings in Germany.

6. *Effect of temperature*

The lower the temperature the greater the risk of cases occurring, and the appearance of cold bleak winds, even for a day or two, was always looked upon by us as ominous; consequently, during the five months from November to March, one lived in almost constant dread of the sudden appearance of the disease. It is perhaps not fair to blame entirely the cold wave, because severe cold leads to the very unhygienic habit amongst the recruits of herding in barracks, and causing coryza, throat and respiratory diseases, which lower the resistance and render them susceptible to the effects of meningococcus.

7. *Humidity*

Compton, working in Egypt and also in the British Isles, lays great stress on the relation between the relative humidity of the air and the occurrence of cases. He records a case that developed cerebro-spinal meningitis after being in a hot bath for over an hour, inhaling the heavily vapour-laden atmosphere of the room. It is even suggested that by observing the humidity charts it may be possible to predict the occurrence of cases. This point was investigated by me as it was apparent that in a dry, sandy and barren place, devoid of lakes and rivers, like Nasirabad, this factor could hardly play as important a rôle as it would in places like Egypt and England.

Note.—Chart for the year 1932 is not appended as only one case was reported during the 12 months. Here again very great similarity exists between it and those of the previous years. Humidity during the month of December, in which the case occurred at humidity 57, was generally much lower than the two rainy months of July and August.

Official records of the humidity of the air, previous to the year 1930, are not available, but, as the largest number of cases have occurred during 1930 and 1931, these years could be

considered to form a fair average. For reasons of space, the humidity charts per month have not been included, but it is obvious that in Nasirabad the humidity factor has no connection whatever with production of cases. The above charts indicate that the majority of cases occur much below the curves of the most humid months (July and August) of every year. All over India humidity is highest during the rainy season, Nasirabad being no exception. If humidity was an important factor, one would reasonably expect more than the 17 per cent of cases that have occurred during the most humid period from May to October (*see table III*).

As the unit is in occupation of eighteen blocks of barracks and as cases have been noted independently from various buildings at various times, it was not possible to keep an accurate record of the actual internal humidity conditions of each one of them; but if, as Compton states, internal humidity is dependent on external atmospheric conditions, then, in my opinion, this factor played an unimportant rôle in this station. It is, however, remotely possible, that the comparatively humid conditions within the old barracks may have been a contributory factor in the production of a large majority of cases and carriers in these barracks. In this station the men of this battalion are housed in two entirely different types of quarters—the old and the new buildings. The old ones are narrow, low-roofed and dark, decidedly admitting less sunlight, and allowing but little free interchange between outside and inside air. The new type have more doors and windows, are without dark corners, and above all have good stone-paved flooring. This is in marked contrast to the old barracks, which have mud floors covered with *lipoid* (a mixture of horse-dung and sand).

8. *Relation of cases to old and new barracks*

All the cases, except two, have come from the old type barracks and a very large proportion (80 per cent) of carriers have for years been lodged in them. It is, therefore, clear that the interference with free circulation of air and sunlight, together with the *lipoid* floors and the very pernicious habit of the men of spitting in and around the corners of the buildings, have materially helped in carrying on the disease from one season to another, through the medium of its unduly high percentage of carriers.

9. *Effects of fatigue*

It has not been possible to find a practical method of gauging accurately the effects of fatigue, but considering the significant fact that 30 per cent of total cases appeared during the third month of the recruits' service—the period associated with the most strenuous time in the training—it suggests that this cannot be a negligible factor, and that it plays a part of great

importance in production of cases. It is held that change of environment and occupation due to transfer from civil to military life, the fatigue incidental to military training, and the association with the permanent members of the staff of the battalion infected with micro-organisms, have been important factors at Nasirabad.

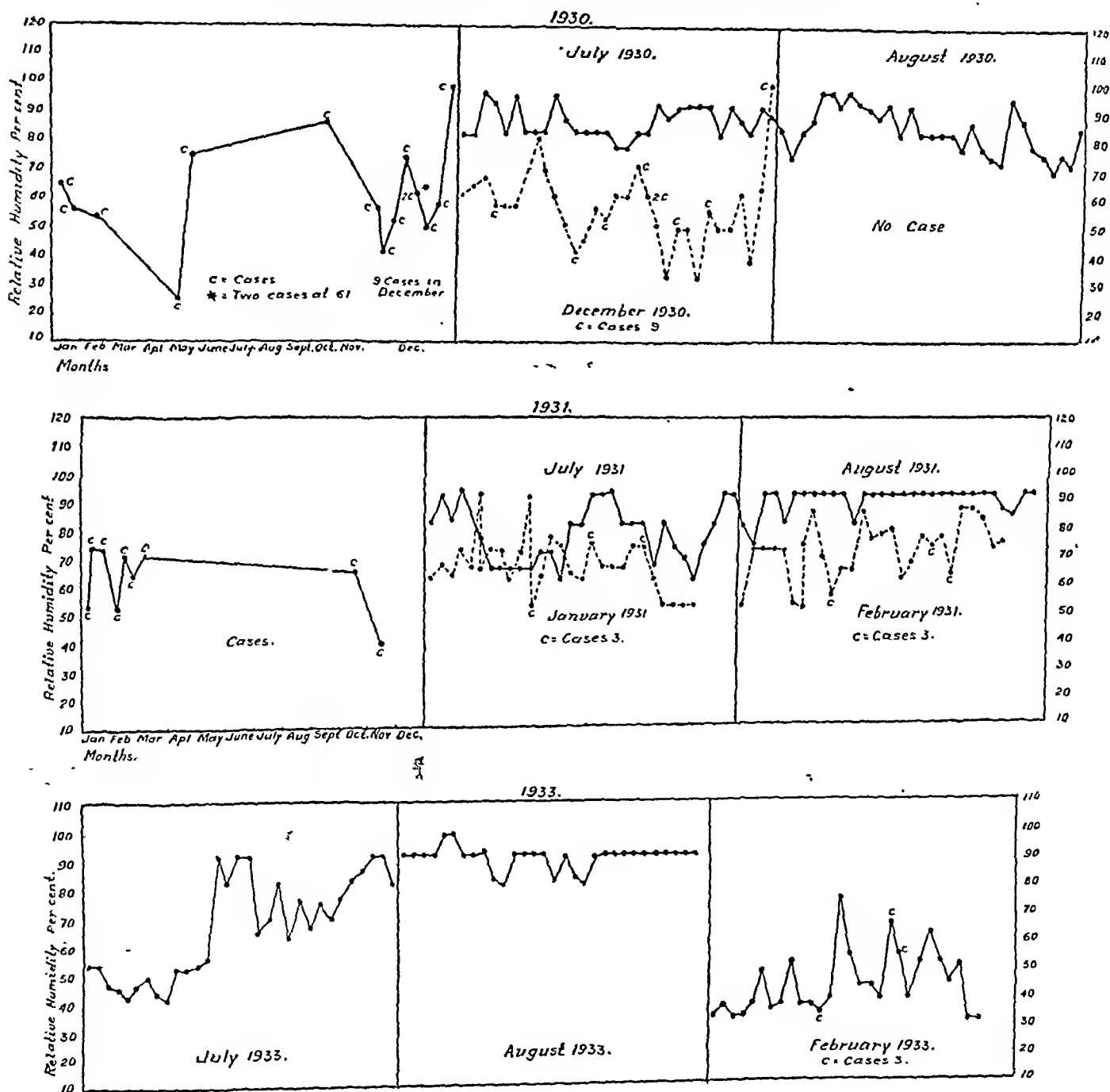
of cases in the third month of their service remains unaccounted for.

10. Overcrowding

Overcrowding, from the point of view of military standards, either in barracks, or within the unit area, has always been associated with

CHART IV

Showing incidence of cases and their relation to outdoor atmospheric humidity, during the years 1930 to 1934, and comparing with the most humid months of the year



It seems that the repeated and persistent occurrence of cerebro-spinal fever cases in the numerous training battalions, in various countries, becomes explicable by this hypothesis. Should the fatigue factor be entirely unconcerned in precipitating the disease in susceptible recruits, the occurrence of over thirty per cent

occurrence of cases. There was evidence of overcrowding within the barracks, during the outbreak of December 1930 (when we had 9 cases). Again in February 1933 three cases were admitted to hospital within a week, while the battalion was in the midst of its 'regimental reunion', a quinquennial function associated

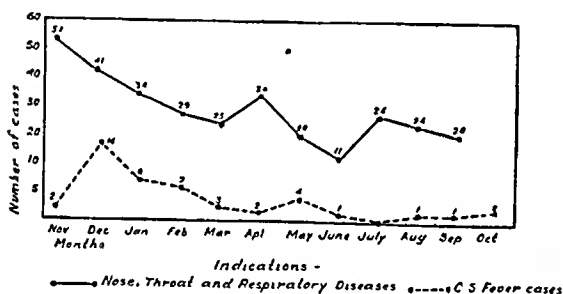
with a fortnight's gaiety and feast making, when some 550 extra men were entertained in Nasirabad. Though 250 were lodged in a special camp, the remaining 300 had to be accommodated in the barracks and all available buildings. Here, once more, temporary but definite overerowing was apparent.

11. Relationship between cases and prevalence of respiratory diseases

It has long been observed that the predominant number of cerebro-spinal fever cases and carriers are found during the time that respiratory diseases of mild pathogenicity, such as coryza, pharyngitis, influenza, and bronchitis, are most prevalent. This factor by encouraging sneezing, coughing and generally increasing the 'spraying capacity' of carriers is an important predisposing cause. It is also likely that these diseases by lowering the vitality make them more prone to infection by the meningococcus.

CHART V

Showing total monthly admissions for nose, throat, and respiratory diseases (1927 to 1934) and comparing with cases of cerebro-spinal fever



From the above chart it will be seen that the largest number of cerebro-spinal fever cases occur between December and February, and the rate of admission for nose, throat and chest diseases is also highest from November to January. A closer relationship between the two diseases is established if the entire black curve is shifted one month forwards. It will then be noticed that the peaks of both coincide extremely closely. It can therefore be assumed that it takes about a month for the effects of the increase in respiratory diseases to be reflected in occurrence of cases of cerebro-spinal fever.

Summary

1. The disease was checked in a most striking manner immediately on isolation of carriers.
2. It was not introduced repeatedly, as had previously been thought probable, by fresh batches of 'new entries', whose carrier rate was found to be only 1.8 per cent.
3. Though very-large numbers of carriers were found among the permanent staff, they suffered least from the disease.
4. The recruits, while showing few carriers, were most affected. Contrary to expectation,

(Continued at foot of next column)

INFECTIVE WARTS AND THEIR TREATMENT

By L. M. GHOSH, M.B. (Cal.), D.T.M. (Liverpool) and

P. A. MAPLESTONE, D.S.O., M.B., Ch.B., D.T.M.
(From the Medical Mycology Inquiry, under the Indian Research Fund Association)

WARTS, excluding the senile or seborrhœic type, are usually divided into the following four varieties:

1. *Verruca plana seu juvenilis*.—These are usually small and vary in size from that of a pin's head to one or two millimetres in diameter. They occur most often on the backs of the hands, but are also common on the face, especially the beard region and forehead, and occasionally they are found on the scalp and trunk.

2. *Verruca vulgaris* or the common wart.—These are also known as vegetative warts. They are longer than the plane variety and are papillomatous in character, and although they may be as small in diameter as the above type and filiform, sometimes they are as large as half an inch in diameter.

3. *Verruca plantaris*.—These are horny, corn-like growths usually on the soles of the feet but sometimes on the palms of the hands. They do not project much externally but their inward projection into the corium may be considerable. They are often mistaken for corns but differ from the latter by the possession of blood vessels.

4. *Verruca accuminata*.—This type occurs mostly in the folds about the genitals and anus, and is probably always of venereal origin.

In this paper we only deal with the first two varieties.

Ætiology.—Many theories as to the causation of these growths have been put forward, but

(Continued from previous column)

new entrants were singularly free from disease. Only one case occurred among approximately 2,000 new recruits that joined the battalion since 1927. [This statement appears to us to be contradictory. Presumably the writer means that only one recruit developed the disease subsequent to his arrival but within the incubation period of the disease.—EDITOR, I.M.G.]

5. When the carrier rate in the general population rose to 14 per cent cases began to occur.

6. Very close relationship is established between occurrence of cases and overerowing, prevalence of respiratory diseases, winter season, period of training, and the age of the recruit.

7. Humidity of air had no bearing on the production of the disease.

[The paper sent to us by Captain Ardeshir is too long for publication in *extenso* in this journal. The parts omitted deal mainly with the bacteriology and technique. We hope to be able to publish a summary of this portion at some future date.—EDITOR, I.M.G.]

until the researches of Wile and Kingery (1919) and Kingery (1921) were published indicating that a filtrable virus was probably the causal factor none appeared satisfactory. This theory is now generally accepted by dermatologists.

Treatment.—As the theories of the ætiology of warts were numerous so also were the methods of treatment recommended. For instance, amongst others Bloch (1927) claimed cures by auto-suggestion, Dietel (1928) and Duprat obtained good results from protein shock, Sezary (1928) employed hæmotherapy with varying success, Laurie (1932) advocated bismuth salicylate injections, and Sutton (1927) claimed that arsphenamine was a cure.

The number and variety of treatments recommended is sufficient indication that none can be very satisfactory.

Biberstein (1925) was the first to suggest treatment of warts and condylomata by the injection of an autolysate, and he reported a cure rate of 75 per cent of his cases, in some instances having to give as many as forty injections to effect a cure. Cormia (1934) used Biberstein's method but reported unfavourably upon it. Most of Cormia's cases were of the 'vulgaris' type, and our results, which are given below, offer a possible explanation of this worker's non-success.

Encouraged by the success attending the treatment of a series of molluscum contagiosum cases by injections of an autolysate (Ghosh, 1934) we decided to try similar treatment in the case of warts.

Preparation of the autolysate.—The warts are sterilized by the application of alcohol, and ether in equal parts. They are then carefully removed so that no normal skin is included in the portion cut off. A known weight (in this instance 20 mgm.) of wart tissue is ground up in a sterile agate mortar with sterile pumice-stone powder until it forms an uniform emulsion when mixed with sterile normal saline solution. The amount of saline used for the above quantity of wart tissue is 20 c.cm.

The mixture is placed in an incubator at 37°C. for 24 hours and is then filtered, first through a Kieselguhr filter and afterwards through a Chamberland candle no. L. 3, under negative pressure.

A quantity of saline containing 0.25 per cent commercial formaldehyde and equal in amount to the filtrate is added to it.* The filtrate is

now tested for sterility, and if found to be free from bacterial contamination it is ready for use.

Dosage.—The initial injection for adults was 0.2 c.cm. of the filtrate prepared as described above. Subsequent doses were increased each time by 0.2 c.cm. until 1 c.cm. was reached after which no further increase was made. The injections were given subcutaneously or intracutaneously twice weekly. From the case abstracts in the table it will be seen that as few as six injections effected a cure, and twelve injections was the greatest number given in any case.

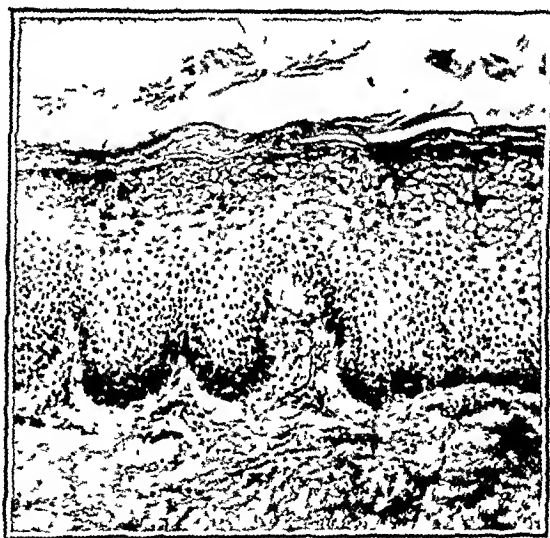
It was found that plane warts responded readily to treatment, and if not cured rapidly they at least improved very much, but warts of the papillomatous type did not respond at all to autolysate injection and cleared up with injections of a bismuth preparation given intramuscularly.

Both forms of warts are held to be produced by the same infecting agent, the vegetative type only being an advanced stage of the plane variety so it was decided to try and discover by histological examination why one type responded to treatment and the other did not. Warts of both types were removed and sectioned and these were examined by Dr. M. N. De, Professor of Pathology at the Medical College Calcutta, whose report is given below.

Report of Dr. De

Type 1. *Verruca plana*.

The principal changes in this type are confined to localized changes in the skin.



Verruca plana.

(1) Hyperkeratosis of the horny layer is present in varying degrees in different sections, but in none of them is it so well marked as in the papillomatous type.

(2) There is a marked thickening of the corium and hyperplasia of the epithelial cells almost obliterating the connective tissue of the papillae. The epithelial prolongations are seen to penetrate deeply into the sub-epithelial tissues instead of being heaped up outwards as in the papillomatous type. The inflammatory cellular exudates and dilatation of blood vessels are

* In the treatment of molluscum contagiosum Ghosh (1934) used formalized autolysate with a strength of 0.2 per cent formalin, but on account of the pain it caused a change was made to carbolyzed autolysate. The latter, however, did not appear so efficacious. In treating psoriasis Panja and Maplestone (1935) abandoned formalized autolysate for the same reason as the above and got good results with carbolyzed autolysate. In the present instance it was found that reducing the strength of formalin to one-half lessened the pain of the injections and yet it was of sufficient strength to keep the solution sterile.

TABLE
Plane warts

Case number	Caste and sex	Age in years	Duration of disease	Distribution	Number of injections	Result	REMARKS
1	M., M.	30	2 years	Face, forehead and temples.	8	Cured	After fourth injection was away a month, and given another 4 injections on his return.
2	H., M.	20	2 months	Face, temples and neck.	6	Cured	No relapse for one year.
3	M., M.	17	3 months	Face and scalp.	7	Cured	Lysate from case 2 used.
4	M., M.	48	1 year	Face and trunk.	7	Cured	....
5	Jew, M.	31	1 month	Scalp and forehead.	6	Cured	Fresh warts appearing at first. None after third injection; all gone after sixth injection except 2 large horny warts which were cauterized with CO ₂ snow. Lysate from case 2 used.
6	H., M.	26	..	Chin, neck, fingers and toes.	5	Cured	Cured by 4 injections; one more given. Lysate from case 2 used.
7	M., M.	28	3 months	Face	7	Cured	First 3 injections from case 1. Last 4 autolysate. Discontinued treatment without orders.
8	E., F.	35	..	Extensor surface arms.	10	Much improved.	After 6 injections much improved, stopped coming for a month. Given 4 more injections, not seen again, but had improved further.
9	H., M.	50	2 years	Face	8	Cured	A few vegetative warts also present removed with CO ₂ snow. Lysate from case 2 used.
10	H., M.	7	5 years	Face, scalp, body and legs.	12	Almost cured.	Very extensive warts still appearing at beginning of treatment. Dose reduced as follows: first 0.05, second 0.1, third 0.2, fourth 0.3, fifth 0.5, sixth 0.5 and up to eleventh dose 0.5, twelfth 0.6 c.cm. Still under observation; no relapse.
11	A.-I., M.	22	..	Hands, body, face and legs.	4	Much improved.	Did not come after fourth injection.
12	M., M.	28	4 years	Face and chin.	11	Cured	....

TABLE—concl'd.
Papillomatous warts

Case number	Caste and sex	Age in years	Duration of disease	Distribution	Number of injections	Result	REMARKS
13	H., M.	18	2 years	Dorsum of foot.	8	No effect	First and second injections from case 1. Third to eighth autolysate.
14	H., M.	25	2 years	Under chin and neck.	10	No effect	Eight injections of autolysate and 2 from case 1. Cured by 6 intramuscular injections of bismuth.
15	H., M.	44	2 years	Face and neck.	8	No effect	Autolysate. Subsequently cured by 8 injections of bismuth.
16	H., M.	20	..	Scalp and face.	6	No effect	Three injections lysate from case 7. Three injections lysate from case 14.
17	A.-I., M.	26	6 months	Face	10	No effect	Subsequently cured after 6 injections of bismuth.

Abbreviations.—

M. M. = Mohammedan male.
A.-I. M. = Anglo-Indian male.

H. M. = Hindu male.
E. F. = European female.

present in varying degrees in sections from different cases.

Type 2. Verruca vulgaris.



Verruca vulgaris.

These are typical papillomatous outgrowths from the skin. The papillae are very much elongated and are covered by heaped-up squamous epithelial cells. The

interpapillary connective tissue shows slight inflammatory reaction but marked vascularity. The amount of cornification is very well marked and in the horny layer clumps of melanin were seen.

Conclusion.—Whatever the ætiology of these two types of warts may be they appear quite different histologically and their evolution and growth are not alike.

This report suggests that the difference in structure and direction of growth may explain the different reactions to treatment. It is possible that the plane warts which burrow deeply into the corium are more readily acted upon by substances circulating in the blood than are the papillomatous type whose main growth is outwards.

The principal differences between these two types of warts are well shown in the accompanying photomicrographs.

Summary

The treatment of 17 cases of infective warts by injection of an emulsion made from wart tissue is recorded.

The method of manufacturing the emulsion is described.

Twelve cases of plane warts were treated with remarkably good results, and in five cases of papillomatous warts the same treatment proved quite ineffective.

A report on the comparative histology of these two types of warts is given, and this offers

(Continued at foot of opposite page)

SNAKE VENOMS IN PHARMACOLOGY AND THERAPEUTICS

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and

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(Indigenous Drugs Series No. 56)

THE knowledge regarding snakes and the effects produced by their venoms dates back to the remote past. The symptoms produced by snake venom and the different remedies applied to relieve its effects have formed the subject of study by the ancient peoples. Folk-tales about the peculiar symptoms produced by snake venom in man and the wonderful after-effects of sublethal doses are many and venoms have been regarded as a panacea for many incurable diseases by even those practising the healing art. In fact the snake has become an ideal of the art of healing, magic and authority in Greek mythology. The emblematic figures of Asklepios as an old man reclining on a staff with snakes coiling around it and his sister

Hygieia as a woman holding a snake in one hand and a bowl in the other are well known. The Roman mark of healing 'caudeceus' is represented by flying wings attached to a staff with a pair of snakes coiling around it. Brahma, the Hindu God of creation, has been shown as guarded by the 'Sheshanag', a legendary snake with many heads. Shiva, the Lord of Destruction, has been shown with coils of snakes around his neck. The cobra by virtue of having the mark of 'omega' on its hood has become an idol of Hindu worship in many parts of India.

Strong poisons like snake venoms which produce potent physiological effects and marked constitutional symptoms, if given in mitigated and reduced doses, may produce desirable therapeutic effects. During the last decade attempts have been made to study these therapeutic effects in various diseases and to give a scientific explanation of how they are produced. In this paper we propose to discuss, first the pharmacological action of the venoms of various snakes met with in India and then give an account of their uses in therapeutics.

The pharmacological action of snake venoms

Venom when fresh is a transparent and clear fluid. It is faintly acid in reaction and its consistency varies from that of water to the thickness of the white of an egg. Cobra venom is a transparent, amber-coloured or almost colourless fluid having a specific gravity of 1.110. It is acid in reaction and slightly disagreeable in taste. Crotalus venom varies from a pale to an emerald green and orange or straw colour. It has no taste and its specific gravity varies from 1.030 to 1.044. The venom rapidly becomes alkaline in reaction on account of the disappearance of a volatile acid during decomposition. When dried under a bell jar on concentrated sulphuric acid or in the sun, it loses about 50 to 70 per cent of water and is converted into a yellowish scaly mass and can be easily powdered. If kept in hermetically-sealed ampoules and in a cool dark place it keeps its potency for a long time. The toxic principles of the venom reside in albumins which are thermostable, and a coagulable proteid which is thermolabile. The former is in excess in the cobra and is called 'neurotoxin', and the latter is in excess in viper venoms and is called 'hæmorrhagin'. The viperine venom contains another substance called 'thrombase', which causes intravascular clotting. The specific action of venoms, in short, appears to depend upon the ferments and the lysins they contain. As far as is known, the following substances mainly enter into the composition of the venom—fibrin ferments, proteolytic ferments, cytolytic cells, nerve cells and agglutinins, and neurotoxin having a selective action on all the nerve tissue, especially in the respiratory and vasomotor

(Continued from previous page)

a possible explanation of their varying reactions to treatment.

Acknowledgment

We wish to express our thanks to Dr. M. N. De for the trouble he took in examining our material, and for his histological report which is incorporated in the paper.

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centres. The toxic effects of different venoms are briefly stated in the table below :—

and white 'spectacle' marking on the hood (seen when fully spread) and a black and white

TABLE I (after Rogers and Megaw, 1935).

Class	Nervous system	ON BLOOD AND BLOOD VESSELS		
		Hæmolysis	Coagulation	Hæmorrhages
Hydrophidæ (sea snakes) ..	Paralysis of respiratory centre and muscular system.	Very slight	Slight reduction	Nil
Colubridæ (cobras) ..	Do.	Moderate	Nil	Nil
Viperinæ (true vipers) ..	Paralysis of vasomotor centre.	Pronounced	Intravascular clotting, later incoagulability.	Very pronounced
Crotalinæ (pit vipers) ..	Do.	Do.	Intravascular clotting less pronounced, in coagulability pronounced.	Do.

As regards the action of different venoms on man it has been observed that the neurotoxin in cobra venom has a special affinity for the respiratory centre and for the neighbouring ganglia of the 9th, 10th, 11th and 12th cranial nerves, and a curara-like effect on the motor end-plates of the muscles. The krait neurotoxin has a selective action on the anterior horn cells of the spinal cord.

Phisalix and Pasteur (1928) noticed that animals vaccinated against rabies were refractory to the action of venom of the cobra and viper and *vice versa*; in other words the virus contained an antigen both for rabies and for the venoms. It has been further shown that the exposure of the venom of *Vipera aspis* to ultra-violet rays does not diminish its virulence but increases it in certain cases. The ultra-violet rays however destroy the antirabic power of the

spot on either side of the lower surface of the hood. This form is more commonly found in southern India and Ceylon. There are several varieties in India without hood markings.

Acton and Knowles (1914) found that an adult cobra of 4 feet 2 inches injects about 211.3 mgm. of the venom at a single bite, while the M. L. D. of cobra venom for man of 60 kilogrammes is about 15 mgm., causing death in three hours (see table II). This shows that the cobra generally injects about 10 to 15 times the M. L. D. In the case of a common krait about 5.4 mgm. is injected at a single bite. The M. L. D. for monkeys is 0.15 mgm. and for a man it is estimated to be 1 mgm., it therefore injects about 5 to 10 times the M. L. D.

Chopra and Ishwariah (1931) investigated in detail the pharmacological action of the venom of the Indian cobra (*N. naia*) and reported that

TABLE II
Showing M. L. D. for different types of snakes

Snake	Approximate dose at a single and good bite	M. L. D. for rat	M. L. D. for monkey	Estimated fatal dose for man
Common cobra (<i>Naia naia</i>) ..	211.3 mgm.	0.12 mgm.	2.4 mgm.	15.0 mgm.
King cobra (<i>Naia bungarus</i>) ..	100.0 "	0.05 "	1.8 "	12.0 "
Common krait (<i>Bungarus candidus</i>) ..	5.4 "	0.20 "	0.15 "	1.0 "
Banded krait (<i>Bungarus fasciatus</i>) ..	42.9 "	0.10 "	1.5 "	10.0 "
Indian daboia (<i>Vipera russelli</i>) ..	72.0 "	2.5 "	7.5 "	42.0 "
Phoorsa (<i>Echis carinatus</i>) ..	12.3 "	1.0 "	0.5 "	5.0 "
Green pit viper (<i>Lachesis gramineus</i>) ..	14.1 "	0.5 "	16.0 "	100.0 "

(Quoted from Byam and Archibald)

venom. A temperature of 100°C., although it destroys the toxin and the antivenomous properties of the viper venom, does not produce any effect upon its rabicidal properties.

The venom of the Indian cobra.—A large example of *Naia naia*, the Asiatic cobra, is six feet in length. The coloration of the typical form is yellowish to dark brown with a black

the M. L. D. of this venom varies with different kinds of animals. It is relatively less toxic to frogs, cats and rats but fatal to dogs, rabbits and men. When injected intravenously the venom produces immediate fatal effects. If the dose is large, the animal dies within a few minutes from respiratory failure. The venom being colloidal in nature, its absorption is slow

if injected hypodermically or intramuscularly and hence the symptoms are much delayed and death may be delayed from 4 to 24 hours. When given by the mouth the venom is not absorbed by the intact mucous membrane and does not produce any marked toxic effects. It has been shown that the venom is identical with the salivary secretion, and is a digestive enzyme. It does not affect the activity of the salivary, gastric and pancreatic secretions of man *in vitro*, though it slightly increases the muscular tone of the gastro-intestinal tract in cats and rabbits. Sublethal doses produce a small but persistent rise in the blood pressure in experimental animals. The rise is not due to the stimulant action in the accelerator mechanism of the heart or the action on the myocardium. In experimental animals no concentration could produce any definite stimulation or reviving effect on the failing heart. Large doses appear to act directly on the heart muscle and produce depression followed by cessation of its movements. The rise of blood pressure appears to be due to the temporary stimulation of the vasomotor centres. The subsequent marked fall of the blood pressure is due to late paralysis of the vasomotor centres. The main action of the venom is on the respiratory centre which is initially stimulated, then paralysed. Histopathological studies of the brains of cobra-poisoned mice by Scharenko showed that the toxin paralysed the vasomotors; this was followed by a local stasis and subsequent corresponding necrosis.

It has no action on the motor end-plates of the diaphragm and other muscles involved in the mechanism of respiration. The action of the venom is exclusively on the nervous mechanism and this was demonstrated by Chopra and Chowhan (1931) by a detailed study of its action on protozoa. It was observed that the venom of the Indian cobra is toxic to protozoa. The paralysis of the movements of *Paramœcium caudatum*, which appears to possess a rudimentary neuro-motor apparatus, by cobra venom is confirmatory evidence of its selective action on this organ. It was further shown by them (1932) that the venom of Russell's viper, which is poor in neurotoxic principles, does not produce any effect on the activity of the movements of *P. caudatum*. The action of this venom is mainly on the endothelial cells of the vascular system and, as these protozoa have no organized vascular system, they are immune to the toxic action of viper venom, while the animals which have a well-developed vascular system are severely affected by this venom.

The venom of the Indian daboia and other vipers.—These vipers are considered to be next to the cobra in the order of their toxic action. The most important Indian pitless viper, called the daboia or *Vipera russellii*, is locally known as 'Uloobora' or 'Tic-polonga'. The other important viper is *Echis carinata* also known as the saw-scaled viper, 'Phoorsa' or 'Kupper'.

The daboia is found in all parts of India, Ceylon, Burma, Siam, Sumatra and Java, whilst the saw-scaled viper is frequently met with in the N. W. F. P., Sind, Rajputana, Central India, Madras and Ceylon. Vipers (commonly called adders) are found under various conditions, in open woods where there are slopes and gullies exposed to the sun, on heaths and moors. Heaps of loose stones or tumbled walls are favourite prowling places and hunting grounds for food. Like the American rattlesnake and copper-head they prowl into the farms during the late summer, when the grain has ripened, in search of small rodents and are often discovered under sheaves or thrash piles. In the mountains they occur up to elevations of at least five thousand feet. They return to specific places to hibernate, but in congregating at their dens in the autumn they are not so easily seen, as they hide under the early fall of leaves where their body hue and pattern blend with the ground. The small size of the viper enables it to work its way through comparatively small holes.

The venom of the Indian daboia is a clear orange-coloured oily fluid having a specific gravity of 1.077 and when dried it yields orange-coloured scales or masses. There has been considerable doubt regarding the action of viper venom. Wall and Cunningham were the first to study the action of cobra and viper venoms. Mitchell and Reichert showed that the intense local irritant action and the sense of burning pain felt after the bite of a viper is due to the large quantity of globulin (as much as 25 per cent) present in it, while the albumoses, which are responsible for the nervous symptoms, are present only in very small quantities. Viper bites lead to severe pain, abscesses, gangrene and often multiple hæmorrhages and later to ascending paralysis of the central nervous system. Lamb and Hanna made some observations on the properties of the Indian daboia venom. Rogers working on the antidotes of colubrine and viperine venoms recorded that a small dose of Russell's viper venom intravenously should kill by a rapid fall of the blood pressure without any intravascular clotting, but with a loss of coagulability. This condition could always be produced by injecting a sublethal dose while a large lethal dose produced a fatal circulatory failure. He proved, by cutting the spinal cord, and by direct observations on the portal circulation, that the essential cause of death was paralysis of the vasomotor centre, the heart continuing to beat to the end. The African puff adder, the American rattlesnake and the Indian pit vipers, all produce death in the same manner so that vasomotor paralysis is the main action of viper venoms and, in addition, there is a hæmorrhagic effect which is most marked in the case of the rattlesnake. It has been shown that daboia venom contains a hæmorrhagin which destroys the endothelial cell-lining

of the finer blood vessels and consequently gives rise to ecchymosis and extravasation of blood, and the convulsions seen early in viperine poisoning are due to small hæmorrhages in the cerebral cortex, a cytolytic which dissolves the red blood corpuscles and a fibrin ferment (thrombase) causing intravascular clotting, pulmonary embolism and death from asphyxia. The slow and delayed symptoms after injection of the venom are due to its remaining localized. The fatal dose for a monkey of 25 kilogrammes weight is 7.5 mgm. and for man the M. L. D. is 42 mgm., death occurring in 24 hours. The average dose given at a single bite is about 72 mgm., which is more than double the minimal lethal dose. Crimmins (1931) stated that the diamond back rattlesnake of Texas may discharge 9 to 40 lethal doses of the venom at one bite. In the case of the echis the M. L. D. for a monkey is 0.5 mgm. and for a man is 5.0 mgm. and the approximate dose of the venom injected at a single bite is about 12.3 mgm. (Acton and Knowles, 1914). Here also the snake injects almost double the fatal dose. Chopra and Chowhan (1934) investigated the pharmacological action of the venom of Russell's viper, and found that the hæmorrhagic phenomena appear at the outset of poisoning and are very extensive in character. Death is preceded by spasmodic and irregular respiration, convulsions and asphyxia indicating the involvement of the vagal centre owing to deficient blood supply. In all post-mortem examinations recorded, the lungs show symptoms of asphyxia, petechial hæmorrhages and infarctions. The right side of the heart is full of dark blood and the left side is empty and tonically contracted. In frogs the venom produces less harmful effects. In animals which have died of daboia poison the kidneys show inflammation, mottling of the cortex and extensive hæmorrhages. The serous cavities such as the pericardium, the pleura and the peritoneum are full of sanguineous fluid, probably produced by injury to the delicate endothelial cells of the capillaries, leading to excessive leakage of the blood.

The daboia venom has a marked tendency to produce thrombosis and gangrene at the site of the bite and death is due to secondary shock. The systemic blood vessels, especially the peripheral ones, are found to be contracted and those of the splanchnic area are widely dilated, as in histamine shock. That the nervous centres are not much affected is shown by the fact that in decerebrated animals exactly the same results are produced. If the action is prolonged, these measures are of no avail since the normal relative permeability of the vessel walls to the protein constituents of the blood is lost. Capillary leakage goes on to such an extent that anything injected leaks out of the vessels. The symptoms of shock in daboia poisoning are not due to reflex impulses, but to the local dilatation of the capillaries of the

splanchnic area. The paralytic action of the venom seems to be confined to the capillaries only and is similar to histamine.

In the case of lachesis, Vellard and Vianna (1932) found that intramuscular and subcutaneous injections in dogs produce an initial incoagulability by rapid destruction of fibrinogen and of the complement by the protease of the venom; subsequently there is absence of formation of thrombin due to the action of the venom on the hepatic cells and hæmolysins are also increased. After intravenous injection there is at first intravenous clotting, followed by incoagulability of the blood in about five minutes. It was further shown that, while the venoms of lachesis and trimeresus are anti-complementary, cobra venom has less and slower anti-complementary action and crotalus has no action on the complement at all. A certain incubation period precedes the anti-complementary action. Malcolm Smith and Hindle found that the M. L. D. (for mice) of the venom of the pit viper (*Trimeresus sumatranus*) and *T. vagleri* to be 0.5 mgm. and 2.45 mgm. per kilo. body weight, and that of the sea snake (*Latecauda colubrina*) to be 0.113 mgm. but they doubt that the total yield of the venom for any of these three species is sufficient to render the bite dangerous to a healthy adult person.

Snake venoms in therapy

Snakes and their venoms have been regarded as of great medicinal value in India. Snake venom is called 'sarap visha' in Hindi and 'garala' in Sanskrit. The use of snake venom in Hindu medicine is of comparatively recent origin, as references to it are only met with in such modern works as Ratnavali, Sarkaumudi, etc. The Hindu practitioners obtain the poison by making the reptile bite a piece of wood, and the poison flowing out is collected on a plantain leaf. It is preserved by drying or by rubbing with a little mustard oil and spreading it on the leaf. Although the venoms of other snakes are mentioned, it is chiefly the venom of the Indian cobra which is used.

Almost all the parts of the body of a snake have been used in one or other incurable disease. Dutt (1932) has given a long list of animal products which have been used in Hindu medicine, e.g., extracts of frogs, minced meat of lizards, skull bones of man, meat of sparrows, fats of bear and lion, feathers of the peacock, etc., have been used in different diseases. The use of cobra venom has also been advocated in the treatment of leprosy, incurable ulcers, bleeding, etc.

Ainslie (1826) wrote that the flesh as well as the skin of certain snakes was believed to possess medicinal properties in some of the Eastern countries. In *Ulfaz Udwiyeah* the flesh of snakes is described as possessing 'hot' and 'dry' effects. The dried and powdered flesh of 'Tamool' (an inoffensive hill snake),

and the Malay 'Paumboo', has been known as a remedy against leprosy. The moults of snakes powdered and mixed with oil of *Dalbergia arborea*, when applied externally, is considered of value in epilepsy. The blood has also been used in Mohammedan medicine in the treatment of leucoderma. A preparation of arsenic and dead cobra is applied externally to leucoderma patches and syphilitic rashes in northern India. The wild tribes of North Burma and Shan States eat the flesh of certain snakes. The venom has also been used, in India as a drug of addiction, in the form of a pill. It is mixed with arsenic, opium and musk and is used as a tonic, aphrodisiac and a prophylactic against many diseases. It has been used as a hepatic stimulant in ascites, cholera, collapse, etc.

its efficacy in epilepsy has been revived. Its use in therapeutics is based on its depressing properties on the nerve cells.

It is said that the pathological effects of any given venom on man vary with the dose injected. While large doses are lethal, small doses produce beneficial physiological effects.

The rationale of application of venom in therapy.—The application of venom in medicine may be based on the presence of the following active principles: (a) neurotoxin, (b) cytolytic (with absorption of granulation tissues), (c) coagulative and hæmorrhagic enzymes (production of protein and histamine-like shock) and (d) protective properties against rabies and epilepsy (see table III).

TABLE III

Therapeutic indications of active principles of snake venom

Active principle	Venom	Action and uses
Neurotoxin	Cobra	Depressant to psychical and medullary centres. Heart stimulant. Paralysis of nerve and plates. Sedative in delirium, hysteria, epilepsy, painful cancer, metastases, meningitis, asthma, and low blood pressure.
Hæmorrhagin	(i) Viper	Fall of blood pressure, intravascular clotting and hæmorrhages.
Agglutinin	(ii) Crotalus	Hyperpiæsis, menorrhagia, hæmophilia, purpura and epistaxis.
Thrombase	Cobra	Bleeding piles.
Protein desensitizer	Do.	Epilepsy, asthma, erysipelas and carbuncles (allergies).
Immunizer	Crotalus	Rheumatism and rabies.
	Bee venom	Epilepsy.
	Crotalus	

Snake venom, particularly the venom of *Naia naia* and *Lachesis trionocephalus*, has been used in homœopathic medicine for the last 50 years. The venom next in importance is that of *Crotalus horridus*. Muir in South America used the venom of *Crotalus casavella*. Other venoms used are that of *Bothrops lanceolatus*, *Elaps*, *Apis mellifica* and *Arachnids*. The majority of diseases in which the venom of lachesis is indicated in this system are abscesses, carbuncles, erysipelas, cancer, apoplexy, paralysis, meningitis, mental diseases, asthma, tuberculosis, syphilis, chorea, flushes, metrorrhagia, hæmophilia, hæmoptysis, skin diseases, and the diseases of the teeth. Cobra venom is indicated in diphtheria and malignant tumours.

In Western medicine rattlesnake venom (crotaline) has been used in a number of diseases. It is said to have been employed beneficially in the treatment of pulmonary tuberculosis, acute pneumonia, pulmonary gangrene, asthma, chronic spasmodic cough, hoarseness, neuralgia, chorea, epilepsy, hysteroepilepsy and hæmophilia. The use of the venom for respiratory and nervous affections has been discredited, but quite recently interest regarding

Neurotoxin.—The neurotoxin principle is present in all snake venoms though it preponderates in cobra venom as compared to the venom of vipers and other snakes. This principle has a strong depressant action on the higher centres. Its action is particularly marked on the vasomotor and the respiratory centres. In small doses it has an irritant action, but in large doses or on prolonged contact it produces paralysis of both the sensory and motor end-plates. The venom, therefore, in graduated doses may be used to depress the higher psychical centres and is useful in delirium, hallucination, aphasia and melancholia. Improvement may occur in apoplexy, meningitis, hysteria and chorea. It may be used to depress the respiratory spasms of the asthmatic attack. In small doses it may be useful in early stages of hemiplegia and paraplegia. On account of its producing anaesthesia by paralyzing the sensory nerve endings it has been used locally to stop the severe pains of inoperable carcinoma.

Cytolytic and tissue absorption.—The venom produces necrosis by damaging the intima layer of the blood vessels when it is injected intravenously. Recently it has been experimentally

of the finer blood vessels and consequently gives rise to ecchymosis and extravasation of blood, and the convulsions seen early in viperine poisoning are due to small hæmorrhages in the cerebral cortex, a cytolyisin which dissolves the red blood corpuscles and a fibrin ferment (thrombase) causing intravascular clotting, pulmonary embolism and death from asphyxia. The slow and delayed symptoms after injection of the venom are due to its remaining localized. The fatal dose for a monkey of 25 kilogrammes weight is 7.5 mgm. and for man the M. L. D. is 42 mgm., death occurring in 24 hours. The average dose given at a single bite is about 72 mgm., which is more than double the minimal lethal dose. Crimmens (1931) stated that the diamond back rattlesnake of Texas may discharge 9 to 40 lethal doses of the venom at one bite. In the case of the echiis the M. L. D. for a monkey is 0.5 mgm. and for a man is 5.0 mgm. and the approximate dose of the venom injected at a single bite is about 12.3 mgm. (Acton and Knowles, 1914). Here also the snake injects almost double the fatal dose. Chopra and Chowhan (1934) investigated the pharmacological action of the venom of Russell's viper, and found that the hæmorrhagic phenomena appear at the outset of poisoning and are very extensive in character. Death is preceded by spasmodic and irregular respiration, convulsions and asphyxia indicating the involvement of the vagal centre owing to deficient blood supply. In all post-mortem examinations recorded, the lungs show symptoms of asphyxia, petechial hæmorrhages and infarctions. The right side of the heart is full of dark blood and the left side is empty and tonically contracted. In frogs the venom produces less harmful effects. In animals which have died of daboia poison the kidneys show inflammation, mottling of the cortex and extensive hæmorrhages. The serous cavities such as the pericardium, the pleura and the peritoneum are full of sanguineous fluid, probably produced by injury to the delicate endothelial cells of the capillaries, leading to excessive leakage of the blood.

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used in South Africa. It is believed that alternate hypodermic and intramuscular injections of venene are useful in hysteria and other nervous conditions such as neurasthenia, illusions, nervous exhaustion, asthenia, profuse and painful menstruation, chorea and paralysis. It has a lasting tonic effect on the cardiac muscles. It is said to accelerate metabolism, soften the walls of the blood vessels and restore the circulation and nutritional processes to normal. It is believed to arrest premature senile decay. Venene treatment, however, still requires further investigation to establish its claims in therapy.

Mackenzie Wallis, W. D. Nicol, N. Craig and others have suggested the presence of an allergic element in a certain proportion of cases of epilepsy and the benefit such as resulted from venom treatment may well have been due to desensitization produced by its injections. In the treatment of epilepsy the venom is given in doses of 1/200 gr. by hypodermic injection; 3 to 5 injections being given at 8-day intervals; afterwards two more doses of 1/75 gr. are given at 14-day intervals. If the symptoms do not disappear, another dose of 1/25 gr. is recommended. It has been advised that during treatment the administration of bromides should be discontinued. The dose and the interval of administration are to be varied according to the age of the patient and the nature of the injury. Fitzsimons pointed out that this method of treatment is not free from danger unless the venom is properly prepared by skilled hands.

Asthma.—Spangler (1925) used intramuscular injections of the proteins of the venom of the rattlesnake (crotonine), which contains a peptone and a globulin, for non-specific desensitization therapy in allergic asthma. An increase in the percentage of eosinophil cells, lengthening of the clotting time of the blood, increasing the permeability of the vessel walls and production of general cell and granular stimulation are all recognized factors in the mechanism of non-specific protein reaction. He took the degree of eosinophilia produced as a guide to dosage and frequency of administration of the proteins. Usually the highest rise in the percentage of eosinophiles following venom protein injection, in doses of 1/400 to 1/50 gr., occurs by the second or third day. Within 5 to 7 days the eosinophiles will usually have dropped to 4 per cent or less, and then the patient may be given another injection. The strength of the dose is not increased if a given strength produces an increase of 8 to 10 per cent of eosinophiles by the second or third day after an injection. By continuing the injections the rise of eosinophiles gradually becomes less and finally does not exceed the normal limits. The patient is then non-specifically desensitized.

Uterine hæmorrhages.—Peck and Goldberger (1933) treated patients suffering from functional bleeding. The venom of *Ancistrodon piscivorus* in solution of 1 in 3,000 in normal saline

was used and 1 in 10,000 merthiolate was added. It is given intradermally in doses of 0.2 c.cm. and subsequent doses of 0.4 c.cm. bi-weekly; improvement occurred within 5 days to 2 to 3 weeks. In some cases six injections were given during a period of 2 to 3 weeks with the control of bleeding; anæmia also improved considerably. The treatment should be continued for at least 3 months after the clinical improvement has manifested itself. During the first 5 to 6 injections care should be taken that the sites of injection are separated by at least 10 cm. The left arm and right thigh can be used alternately. If hypersensitivity occurs it is better to reduce the concentration of the solution to 1 in 10,000 and to continue the dose until 0.4 c.cm. of 1 in 3,000 is reached. The plan of injection to be followed is given below :—

1st injection	.. 0.1 c.cm. of 1 in 10,000
2nd "	.. 0.4 c.cm. of 1 in 10,000
3rd "	.. 0.2 c.cm. of 1 in 6,000
4th "	.. 0.3 c.cm. of 1 in 6,000
5th "	.. 0.1 c.cm. of 1 in 3,000
6th "	.. 0.4 c.cm. of 1 in 3,000

Antivenene also has been used by Stockton and Franklin (1931) in the cases of hæmorrhagic diseases. In severe cases of bleeding, where almost every kind of treatment has failed, the patient was desensitized by giving small intracutaneous injections of antivenene in doses of 0.1 to 0.2 c.cm. every half hour and when desensitization to anaphylaxis has occurred 10 c.cm. of antivenene were injected subcutaneously on the inner surface of the thigh. The bleeding is said to have stopped almost immediately.

Hæmophilia.—The coagulant action of different venoms has been suggested by various workers and has been experimented on in normal human blood and citrated plasma both *in vivo* and *in vitro*. The application of this coagulant property present in snake venoms and its use in hæmophilia was suggested by Prof. Hartridge. It has been noticed that neither coagulant nor anticoagulant action is common to any large zoological group of snakes. In allied genera the venoms of some quite nearly-related species are markedly opposite in action. The only large genus in which the venom is consistently coagulant is the viper. The Indian daboia venom (*Vipera russelli*) was found to be by far the most powerful coagulant agent against hæmorrhage. In the case of hæmophilia it was noticed that once the coagulation started with this venom the process of fibrin formation was completed rapidly. The clot produced was tough and elastic, in marked contradistinction to the soft slowly-forming ineffective clot characteristic of the hæmorrhagic diathesis. Experimentally one drop of Russell's viper venom in concentration of 1 in 1,000 when added to 10 drops of hæmophilic blood clotted it in 17 seconds, whereas the blood from the same patient clotted spontaneously in 35 minutes. In dilutions of 1 in 100,000 the coagulation time

indirectly responsible for the disintegration of the corpuscles, it will be observed that atebirin and plasmoehin did not precipitate the attack, whereas quinine succeeded in bringing it about on two occasions out of three. It would appear, therefore, that the hæmoglobinuria is not dependent on quinine alone, but some other factors also play a part in the production of this condition. What these factors are remains to be worked out. Many of the cases of black-water fever met with in Bengal and Assam are of this nature and it is possible that the substitution of atebirin for quinine in the treatment of malaria will bring about a reduction in the occurrences of such cases.

A CASE OF PAROXYSMAL TACHYCARDIA AND ITS SEQUEL

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The attack.—S. L., Hindu male, aged 23, was admitted to hospital on 7th March, 1934, with the complaint of continuous palpitation of four days' duration. He gave no history of any previous disease other than occasional fever; he denied venereal infection. He had been subjected to recent severe mental strain, as in the Bihar earthquake in January his house came down and all his family except himself were killed.

Severe and continuous palpitation started while he was in the train four days previously; the discomfort was increasing, but there was no pain, no œdema anywhere, and no subjective dyspnoea; the patient was very cyanosed.

The pulse was 180 per minute, perfectly regular, and of normal volume and tension. The cardiac impulse was diffuse, and the apex beat 1 inch outside the nipple line; there was a systolic thrill and the impulse was forcible; a soft systolic murmur was audible in the mitral and tricuspid areas, and the pulmonary second sound was accentuated. Beyond his colour, which was almost blue, and some basal pulmonary congestion, there were no other positive findings.

The Wassermann test was negative.

After a day's observation, during which he was on glucose and insulin, 5 units, the pulse remaining steady between 170 and 180, he was given intravenously one injection of strophanthin 1/125th grain, and the next day three of 1/100th grain with no effect. He was then put on 5 gr. doses of quinidine thrice daily, and after the sixth dose the pulse rate fell suddenly to 90, and remained at that rate thereafter. His colour became normal, and he left hospital relieved on 23rd March. The paroxysm had lasted for about ten days.

The sequel.—On 24th September, 1934, the patient was re-admitted for pain in the left back, fever, and dyspnoea, all of some 12 days' duration. He was found to have a left pleural effusion of clear fluid, some of which was removed and replaced by air on two occasions. Very shortly he developed a pericardial rub and then an effusion; this also was aspirated, and tubercle bacilli were demonstrated in it. There were no intra-pulmonary signs. The patient ran a continued fever of low degree, and became progressively worse until his death on the 7th December, 1934.

Post-mortem findings

Lungs: Right.—Slightly emphysematous. Right side of the pericardium was adherent to the lung on the right side. The adhesions were recent. The pleural cavity contained four ounces of fluid.

Left.—Covered with thickened pleura and collapsed at its base, where a sac had formed by the collection of some fluid in between the two layers of the thickened pleura. A chain of enlarged tuberculous glands was found in the left side of the neck. This chain had continued on to the anterior mediastinum, connecting up with the enlarged tracheo-bronchial chain of glands, which were found adherent to the pericardium and also to the left auricle whose walls were practically fixed to the posterior mediastinum, probably due to a previous adhesive mediastinitis, tuberculous in origin.

Heart.—The heart with its pericardial covering was very much enlarged—the greatest dimensions (after opening the pericardial sac and withdrawing the fluid) were 8 inches by 7 inches. The sac contained 8 ounces of dirty fluid, in which flakes of fibrin were seen floating. The inner side of the parietal pericardium was studded with tubercles, while it was adherent to the right lung with recent adhesions, but on the left side it had completely fused with the pleura. No adhesions of old standing were found in between the two layers of the pericardium. The visceral pericardium was covered with flakes of fibrin and was very rough. It could be compared to a 'bread and butter heart,' where butter was applied more profusely and irregularly. The heart as a whole was displaced to the right and at the same time slightly rotated to the left, so that the enlarged right ventricle had formed the apex, while the left ventricle was much smaller and formed the posterior surface of the heart. The left auricle was so adherent to the posterior mediastinum, that it could not be approached from outside. The mitral valve did not show any stenosis; the tricuspid admitted the tips of more than three fingers. The right auricle was enlarged. The blood vessels arising from the heart were covered with fibrin, but no actual strangulation by fibrous tissue was noticed around them.

Liver, spleen and kidneys.—Showed marked chronic venous congestion.

Morbid histology

Pericardium.—Showed uniform fibrosis with islets of small round cells here and there. Caseous foci were present at different places with some attempt at giant-cell formation.

Heart muscle.—Showed no fatty changes. Brown atrophy present in its early form.

Lymph gland.—Tuberculous.

Comments.—It is interesting that nine months before his death no signs of the infection from which he died were found in this patient. At that time it seemed probable that an emotional factor was the prime cause of the paroxysmal attack. This having ceased, there was no evidence of disease of the heart, a normal electrocardiogram being obtained. It is difficult to believe that, if a tuberculous focus had been the exciting cause, the normal rhythm would have been restored so easily.

Indian Medical Gazette

AUGUST

CEREBROSPINAL FEVER IN INDIA

MENINGOCOCCAL MENINGITIS, or cerebrospinal fever, as it is usually called, must be considered as one of the penalties of civilization. This claim is not dependent on the fact that the disease was not recognized clinically until 1805, when Vieusseux described an epidemic that had occurred in the south of France and in Switzerland, but on the history of the disease as we know it during the last century and a quarter. The disease occurs sporadically in most countries at any season of the year, but it is as an epidemic disease amongst confined communities that it attracts most attention, and it is man's gregarious tendencies that must be held responsible for its existence on the large scale on which it is to be found in many countries in both hemispheres at the present day.

Like other diseases that we associate with modern civilization, most notably tuberculosis, it seems to be taking a course contrary to that of civilization itself, and to be moving in an easterly direction. During the last few years the disease has been showing a very definite downward tendency in the United States, where some of the earliest and some of the most serious epidemics occurred, and in 1933 only about 3,000 cases were reported, whereas in recent years serious epidemics have been reported from Egypt and Turkey, and there has been a marked increase in the number of cases reported from eastern ports.

In India the disease was reported and accurately described as far back as 1878, and in 1883 an epidemic occurred amongst the convict labour force working on the Indus bridge at Sukkur; in this epidemic there were 38 cases and 27 deaths. From this time onwards occasional epidemics have occurred in jails and labour camps throughout the country. During the Great War a number of cases occurred amongst the Indian troops and in the labour forces, and at one time an isolation camp for carriers was established on an island in Bombay harbour. During the last few years there appears to have been a very definite increase in both the epidemic and the sporadic incidence of the disease and in 1934 the incidence curve rose sharply to nearly 3,000, from 458 in 1933. A typical institutional outbreak occurred at the Borstal Institution at Lahore in 1932. We have published two reports of this outbreak; in the first (Vol. LXVIII, p. 265) emphasis was laid on the clinical and in the second (Vol. LXX, p. 252) on the epidemiological aspects. There were 27 cases in a period of about 19 months,

but 16 of these occurred within the first six weeks of the epidemic.

In the present number will be found a report on another typical outbreak that occurred in an Indian training battalion at Nasirabad.

In Calcutta during the last two years there has been a steady incidence of this disease throughout the year; in one hospital, the only hospital into which these cases are systematically admitted, the admission rate averaged 50 cases per month (Vol. LXIX, p. 621) during thirteen months in 1933-1934, and only during the last few months has this sub-epidemic shown signs of abating. A similar state of affairs exists in many other towns in India, and the outlook is not unnaturally a source of considerable anxiety to those responsible for the health of the community, as this widespread incidence amongst the general population is a new feature in India.

Cerebrospinal fever holds a peculiar position amongst the acute infectious diseases in that it is probably spread almost entirely by healthy carriers and that only a small proportion of the human race appear to be susceptible to morbid invasion by the causative organism, though a much greater percentage are able to harbour it as a harmless commensal.

Under non-epidemic conditions when the carrier rate amongst the general population is low and each individual comes into contact with the minimum quantity of the specific virus, or does not come in contact with it at all, only the highly susceptible are picked out, usually children, but under epidemic conditions, when the carrier rate in a community rises to 20 per cent or even higher, each individual suffers a veritable bombardment, and if other factors, such as fatigue, sub-optimal nourishment and other infections, help to lower his resistance his chances of becoming infected are considerably increased, though even in these circumstances the case rate is never very high. Though the carrier state does not appear to confer any immunity, nevertheless the incidence of meningitis is usually lower amongst discovered carriers than amongst the rest of the community, presumably because in the highly susceptible a meningeal infection follows the nasopharyngeal infection so rapidly that there is no time for them to be discovered as carriers.

We have referred to the Borstal outbreak as a typical one; there was little evidence of a steady extension from one section of the institution to another, but within a few weeks the infection had spread throughout the institution and a case or so had occurred in nearly every section. After this the progress of the epidemic slowed down, there were 10 cases in the next ten months, and then finally an isolated case 19 months after the commencement of the epidemic. The carrier rate of the institution was found to be 12.83 per cent and the highest case rates were associated with the highest carrier rates. The population of the institution

is about 1,700 but it is not a static one, so that the incidence was not more than 1 per cent of those that came in contact with the infection. The incidence is typical because of the extremely rapid dissemination of the infection throughout the institution and because the final case rate was less than one per cent of the total population at risk.

The Nasirabad outbreak also has many characteristic features. The population was again an ideal one, consisting mainly of young adults, who were in addition subjected to unaccustomed fatigue. The permanent staff of the depot, amongst whom were a high percentage of carriers, suffered little, but the cases occurred amongst the new recruits. The cessation of the latter outbreak was probably due to the energetic measures that were taken, but epidemics of cerebrospinal fever have a habit of ceasing suddenly, though admittedly they are less likely to do so when the fire is being intermittently fed with fresh fuel.

The rapidity with which the infection spreads makes it difficult to check it in a closed community, when it is once established, even by the detection and segregation of carriers, and this measure is quite useless if they are sought amongst contacts only; a safer method is to isolate the whole community and to adopt methods of general hygiene within it. When one has to deal with a large population, such as that of a town, the isolation of carriers is out of the question, and it seems doubtful if much can be effected by the closing of schools, and places of entertainment. One is driven to seek consolation in the provision of efficient treatment.

The introduction of the serum treatment of cerebrospinal fever has brought about a very considerable improvement in the prognosis. The death rate was at one time seldom below

75 per cent, but nowadays reliable statistics showing a death rate of 33 per cent are quite common. However, even when anti-serum is employed a much higher death rate sometimes results, as high as 80 per cent in some instances.

In the two institutional outbreaks referred to above the death rates were 55 and 41 per cent, respectively. The standard commercial anti-serum is prepared from meningococcal strain 'types' I and III. A certain amount of 'typing' of the local strains has been carried out, both in Calcutta and at Kasauli, and from the results so far obtained, it seems that the large majority belong to one or other of these 'types'. The commercial anti-serum should therefore be effective, but it is quite possible that there are local sub-types against which a true autogenous serum would be more effective.

It is therefore of great importance that as large a number as possible of strains of meningococcus should be collected in different parts of the country and separated into their various types and sub-types. It may be found that strains collected in Calcutta differ from those collected in Lahore to the extent that they agglutinate at a slightly higher titre with their autogenous serum than with the apparently homologous serum prepared from strains collected in the latter town. If this is the case, it will be necessary to prepare serum for each province or even for each town as it has been repeatedly shown that serum made from locally-isolated strains is the most efficacious. In any case it is almost certain that a more effective anti-serum than is at present available can be prepared if a large number of Indian strains are collected and pooled. This has already been done in at least one town in India, but it is probable that a still more efficacious serum might be produced if more strains were used in its preparation.

Special Article

THE QUESTION OF MARRIAGE IN PULMONARY TUBERCULOSIS*

(A CRITICAL CONSIDERATION WITH SPECIAL REFERENCE TO INDIAN CONDITIONS)

By Y. G. SHRIKHANDE, B.Sc., M.B., B.S., T.D.D. (Wales)
King Edward VII Sanatorium, Bhowali, U. P.

THE advice of medical men is often sought by tuberculous patients and their guardians on the question of marriage and married life. Two questions are generally asked—Whether a tuberculous patient should enter the married state? and—If the patient is already married, should the non-consumptive partner continue to live with the consumptive patient?

As the future happiness of the patients depends on the advice they receive, it is natural that they should expect correct guidance from their physicians. In view of the fact that tuberculosis is becoming very common in this country, especially among young people of marriageable age, it will not be out of place to consider these questions in some detail.

These questions involve a consideration of the following factors:—

- (1) Whether there is any danger of transmission of the disease to the healthy partner.
- (2) Whether there is any danger to the children born of consumptive parents.
- (3) Whether married life affects adversely the health of the patient.

* Being a paper read at the King George Thanksgiving (Anti-tuberculosis) Fund Conference held in New Delhi on 11th Dec. 1934.

Effect on the healthy partner.—It has been a very common experience that pulmonary tuberculosis in both husband and wife is rare in spite of the fact that they come into more intimate contact with each other than anybody else. Even in families where most of the children have been affected with tuberculosis, it has been found to be rare for both mother and father to be suffering from the disease.

A great deal of statistical work has been done in this connection. Mongour found that among 440 married couples in whom one of the consorts was suffering with tuberculosis, in only 4 per cent was the partner also found to be suffering. Thom found only 3 per cent in 402 couples. Levy found 2.8 per cent in 317 couples who were living in poverty and sharing the same bed.

A very interesting case is that of Metchnikoff who, despite the fact that for four years he remained in close association with his wife suffering from advanced tuberculous disease and took no precautions against contagion, he remained free from the disease for 44 years from the time of his marriage.

Ward, on the other hand, found that over 50 per cent suffered from conjugal tuberculosis in the working and lower middle classes and he tried to prove that direct infection played an important part in the spread of the disease. But Ward did not take into consideration the associated conditions, such as overcrowding and general insanitation, that could be held responsible for producing a higher percentage of incidence among the consorts of the patients.

Longstaff, basing his results on mathematical calculations which he deduced from the Registrar-General's reports, came to the conclusion that the prevalence of marital tuberculosis was not greater than might be expected as a matter of coincidence. He says, 'If the results are anywhere near the truth, they show that a far greater number of coincidences of the death of both husband and wife from phthisis, within a short period of one another, would be required to prove that one had contracted the disease from the other by infection'.

The above facts show clearly that the danger of transmission of the disease to the consort is not very great. The reason for this is not very difficult to find. The unaffected partner has, in all probability, been infected in childhood and reinfection is unlikely. Experimental work has shown that a very large majority of people in civilized countries become infected with the tubercle bacillus within the first few years of life and immunity is developed in them which is sufficient to protect them in future life from all ordinary exposures. Married people are no exception to this rule. Whether the consort will develop the disease depends on factors other than mere association with the consumptive partner.

It cannot, however, be denied that in the spread of the disease opportunities for acquiring infection from those who are the source of dissemination of the bacilli must play an important part. At the same time, it must not be ignored that the important factor determining whether a person will develop the disease or not is the power of resistance possessed by the individual. In other words, the seed comes to all, but whether it will germinate or not is determined by the soil on which it settles down. As mentioned above, the tissues of the body of the consort no longer remain vulnerable, but become highly resistant to further attacks of the bacillus on account of the protective reaction which they develop in the shape of immunity as a result of the infection which the consort had received in childhood.

The disease if and when it occurs in the consort may be accounted for by environmental conditions, such as overcrowding, general insanitation, poverty and diminished resistance, which last condition may be brought about, in this country particularly, by tropical diseases such as malaria, kala-azar and dysentery, as well as by the peculiar social customs and prejudices of the people.

Take, for instance, the purdah system and child-marriage which, as a rule, go together. There can be no doubt that purdah is one of the most important social customs that helps in the causation of tuberculosis in India. By shutting out sun and fresh air, it helps to develop the disease in women. Similarly with child-marriage, these young girls while yet incompletely mature are subjected to the physical strain of pregnancy, confinement and parturition. Is it difficult to conceive that under these circumstances tuberculosis in female consorts should occur in greater frequency? Why blame the tubercle bacillus for causing the disease when the ground has been made ready for it by these obnoxious customs? Our thanks are due to Dewan Bahadur Harbilas Sarda for bringing about the much-needed reform although experience has so far shown that the Sarda Act has not achieved all that its originator hoped of it.

Carl Pearson and Pope from an investigation of 40,000 married couples came to the conclusion that there is an excess of tuberculous infection between husband and wife beyond what chance alone would account for and they believed that this excess might be due, in part at least, to what they called 'assortive mating'. This slightly increased frequency of infection which might exist amongst the middle and professional classes, in whom assortive mating is possible, is probably due to the fact that persons with a tendency to tuberculosis possess certain common mental and physical traits which excite sexual attraction between them and lead to unconscious mating of like with like.

The factor of assortive mating does not, however, enter into consideration on the question of marriage in this country and even in western countries assortive mating does not exist to any appreciable extent in the poor classes. Therefore the increased frequency of tuberculosis in married people must be accounted for by the intensity of environmental infection from overcrowding, general insanitation and diminished resistance brought about by adverse conditions of life.

There is, however, one point which must be taken into consideration with reference to Indian conditions. The possibility of increased marital infection may be accounted for by the presence of what is called 'virgin soil' in this country, due to the fact that infection with the tubercle bacillus has not penetrated every place. It is possible for this reason for a phthisical patient to give infection to his or her uninfected healthy consort who might have come from virgin soil. With the growth of urbanization and industrialization, however, that is now taking place, the factor of virgin soil will soon disappear and infection to the healthy consort after marriage will become negligible as is the case in western countries.

Danger to the potential offspring.—There can be no doubt that the danger of infection to the children of consumptive parents is very great. The probability of the child of a tuberculous parent becoming tuberculous is far greater than the probability of wife or husband being similarly attacked. No child is born with tuberculous infection. Tuberculin tests applied to children have proved beyond doubt that children are born free of tuberculosis. It is only after birth that infection is acquired. Since they are born free from tuberculous infection, they have no immunity developed in them. If, therefore, the new-born child remains in close proximity to the consumptive parent, it will become infected during infancy and succumb from a generalized form of tuberculosis. Patients with open tuberculosis should therefore not bear children, and if children are born under such circumstances they must be removed at once from the dangerous environment of the patient. If they are removed at once, there is no reason why they should not be as free from the danger of infection as any other children. Bang has proved this fact by means of experiments done in Denmark on calves born of tuberculous cattle; none of the calves that were separated immediately developed tuberculosis. The Grancher system of prophylaxis is based on the same principle as Bang's experiments. According to this system children are removed, while still healthy and uninfected, from their infected homes and sent to live with healthy families. This system was introduced in France in 1903 by Professor Grancher.

Whenever the Grancher system is not possible trial may be given to Calmette's B. C. G.

vaccine for the prophylactic immunization of infants. This vaccine is given to infants by mouth, as advocated by Calmette himself, within the first ten days of life. Calmette claimed very satisfactory results from this method of immunization.

It is especially dangerous for actively consumptive women to raise infants who will surely catch the infection from her and die. The danger of infection to the infant is not from mother's milk, as is popularly believed, but from intimate contact with her, which brings about massive infection from her sputum. As we know, suckling children from the mother's breast is a very common practice in India. Infants in India therefore run a very great risk of infection as compared to infants in western countries where this practice is not so universal. Moreover, the economic condition of the people in this country is such that it is not easy to separate the child from the mother. A very practical method under these circumstances would appear to be to stop the production of sputum in the mother by the use of artificial pneumothorax or other collapse-therapeutic measures. The mother is thereby not only made a harmless member of the family, but she also regains the right of motherhood and can bear healthy children and bring them up herself.

It might be asked whether a child born of tuberculous parents is more liable to tuberculosis than a child of non-tuberculous parentage. It has not been proved definitely that there is anything specific in the inheritance from the tuberculous parent that makes the soil more susceptible to tuberculosis than a child born from parents who are suffering from reduced vitality from any other cause. All things being equal, the stronger and healthier the parents the stronger and more resistant the child. If the child of tuberculous parents does suffer from tuberculosis, it is more probably due to the unhealthy environment under which the parents live than to the presence of the bacillus itself. In fact, it is believed by some that the children born of tuberculous stock withstand the disease better because they have greater immunogenic power developed in them than those of non-tuberculous families.

Effect of the married state on the patient.—The effect of the married state on the patient is necessarily somewhat different on men and on women. On the average male patient, sexual intercourse has the same effect as on an average person who is not in good health. Excessive intercourse will affect his health for the worse just as it will affect any man's health who is feeling below par. Complete abstinence is undoubtedly the ideal course to adopt but since this is not practical in the case of every patient moderation is the safest course that one can advise. If moderately indulged in, sexual intercourse is not likely to do much harm; it may

even be desirable because it would prevent unnecessary brooding over enforced abstinence; which must prove harmful in the long run. Moreover, the married state might preclude venereal complications which would affect adversely the course of the tuberculous infection.

It is a popular belief, also shared by the medical profession, that tuberculous patients suffer from increased sexual irritability and it is a remarkable fact that even in the advanced stages of the disease sexual potency may be retained. This sexual irritability has been attributed to the toxæmia caused by tuberculosis and also to the indolent life that the patient has to live, under treatment. Under these circumstances, complete abstinence would seem to be a counsel of perfection. The duty of the medical men should be to tell the patients about the bad effects that may accrue from over-indulgence and advise them to observe the golden rule of moderation.

With women things are somewhat different. So long as they do not become pregnant there seems no reason why they should not enjoy their married life in moderation. As a matter of fact, the married patient is often better situated than the single because there is a partner in life to look after him or her. Very often it has been found that a good woman has helped her consumptive husband towards recovery, which would have been difficult if the patient had remained unmarried. Similarly, many a female patient has recovered after marriage to a man who gave her a good home, proper care and nourishing food. In short, the financial resources affect the question of marriage considerably, as they provide the patient with the means of carrying out the necessary treatment.

The effects of pregnancy on consumptive women have not been properly appreciated and divergent views have been expressed on the point. One school believes that pregnancy often ameliorates the condition of female patients and, therefore, on this assumption recommends marriage for tuberculous girls. In India, it is not uncommon for *hakims* and *kavirajis* to recommend marriage for girls who are suffering from tuberculous disease. The reason for this recommendation may perhaps be that married life stimulates the endocrine system of the patient and endows her with a certain degree of immunity.

There is no doubt that during pregnancy the patient very often looks better and the disease appears to abate. The explanation for this may perhaps be found in the circulatory changes that take place in the patient during pregnancy. The mucous membranes of the respiratory organs are congested and this probably retards the progress of the disease for the time being, just as is the case in mitral stenosis. It is also very probable that in pregnancy the enlarged

uterus pushes up the diaphragm and keeps the lung compressed as occurs following phrenic evulsion. After confinement, the diaphragm descends, the upward pressure is removed from the lung, and the disease begins to advance again. It may be possible to prevent this sudden decompression of the affected lung by the application of a tight bandage beneath the breasts whereby relative compression and immobilization of the lung is obtained. It would be interesting to find out if phrenicectomy done immediately after confinement would keep the disease in check.

The second school holds that pregnancy, labour and lactation are liable to reactivate latent tuberculosis and cause aggravation of active lesions. More recent statistics, however, do not bear out this contention. The rational view on this question would appear to be that, while pregnancy in women with active and progressive lesions is fraught with danger because the disease in such cases is very liable to advance rather rapidly after child-birth, in chronic, quiescent and arrested cases no harm ordinarily results from it.

It is not so much the single pregnancy as multiple pregnancies at short intervals that prove injurious. Repeated pregnancies must therefore be avoided especially when active lesions are present in the lungs and preferably for some time, say two or three years, after all symptoms have subsided.

Consumptive women should be given instructions on the use of contraceptives, when celibacy is not possible. If they still become pregnant conservative treatment should be tried first of all. When this fails, then only should therapeutic abortion be considered. Experience has, however, shown that, while abortion is not required in quiescent cases, in active and progressive ones it rarely saves the patient's life.

The demand made by certain people that tuberculous patients should not be allowed to marry is devoid of all common sense and not practical at all. The remedy will be found to be worse than the disease itself. The race is not in danger of deterioration because of children derived from tuberculous stock. It has been shown above that tuberculous cattle have been used for breeding purposes by removing the calves immediately after birth. The same may hold true in the case of human beings. And what remedy would be applied against those who were already married before the advent of the disease? Moreover, prohibition of legal marriage does not exclude extra-marital sexual intercourse. Free instruction on the prevention of conception is likely to be of greater value than the prohibition of marriage.

It must be remembered that the tuberculous patient has the same desire for home and love as anybody else and in giving advice we must be 'practical' though this may fall short of the 'ideal'.

Conclusion

The problem of marriage in tuberculous patients and tuberculosis in married patients is bound up more with social and economic considerations than the mere question of infection from one party to the other. Provided that the usual common-sense precautions are observed, there appears to be no more risk to the consorts of tuberculous patients than to anybody else in frequent contact with the patient. Nor is there so much danger, as is popularly believed, to the

patient from married life provided it is not lived recklessly. Tuberculous patients who contemplate marriage should wait for some time after all symptoms of active mischief in the lungs have ceased. In females, conception should, as far as possible, be avoided at least as long as active lesions are present in the lungs. The danger of infection to the children can be avoided by separating them from their parents immediately after birth (Grancher system), or minimized by the use of B. C. G. (Calmette method).

Medical News

DIPLOMA IN GYNÆCOLOGY AND OBSTETRICS

THE Government of Madras have recently instituted a diploma in gynæcology and obstetrics. This diploma will be styled L.G.O. (Licentiate in Gynæcology and Obstetrics) and will be awarded to candidates who undergo a special course of clinical training at the Government Hospital for Women and Children, Madras, attend the prescribed tutorial classes and pass the final qualifying examination at the end of the course. The course is open only to non-graduate medical men and women of not less than five years' standing. The number of candidates to be trained at one course will not exceed six. The following fees will be levied from all candidates other than those in permanent Government service under the Madras Government: (a) the fees for the course is Rs. 100 for the first quarter and (b) Rs. 50 for every subsequent quarter; (c) examination fee Rs. 30. Full details of the scheme can be obtained from the Superintendent, Government Hospital for Women and Children, Egmore, Madras. Applications for admission to the course should be made to the Superintendent of the above hospital.

BENGAL MEDICAL COUNCIL

EXTRACTS from the Minutes of the Bengal Council of Medical Registration, held on the 13th August, 1934:—

1. The statement of minimum requisites to be satisfied by the Jackson Medical School, Jalpaiguri, for continuance of affiliation as drawn up by the committee appointed to inspect recognized medical schools was approved.

2. Government order accepting the proposal of the Council that under section 21 of the Bengal Medical Act, 1914, the title 'License in Tropical Medicine' granted by the Calcutta School of Tropical Medicine may be entered in the Register of Registered Practitioners as an additional qualification against the name of a registered medical practitioner was recorded.

3. Reports on the inspection of the under-mentioned institutions by a committee appointed by the Council were discussed and approved:—

- (a) Ronaldshay Medical School, Burdwan.
- (b) National Medical Institute, Calcutta.
- (c) Bankura Sammilani Medical School.

4. Report of the committee appointed by the Council to consider the rules for the provident fund of the office was approved.

5. Government notification announcing the appointments of the under-mentioned gentlemen as members of the Council were recorded:—

Dr. Subodhchandra Mitra, M.B., F.R.C.S., under section 4(f), Bengal Medical Act, 1914.

Major P. C. Banerjee, F.R.P. & S., I.M.S., under section 4(e), Bengal Medical Act, 1914.

Major S. Nag, M.R.C.P., F.R.C.S., D.T.M. & H., I.M.S., under section 4(e), Bengal Medical Act, 1914.

Major T. H. Thomas, M.D., M.R.C.P., I.M.S., under section 4(e), Bengal Medical Act, 1914.

6. The under-mentioned gentlemen were nominated representatives of the Council and the Governing Body of the State Medical Faculty of Bengal on the Bengal Sanitary Board:—

- (1) Dr. Taraknath Majumdar, L.M.S., D.P.H., D.T.M.
- (2) Dr. Abdul Majed, M.B., D.P.H., D.T.M.

7. It was decided that the under-mentioned schools be inspected during the next six months:—

- (1) Campbell Medical School, Calcutta.
- (2) Jackson Medical School, Jalpaiguri.
- (3) Chittagong Medical School.

8. The reports of the committee proposing amendments in (a) the Bengal Medical Act, 1914, and (b) the election rules under the Act were postponed for consideration at a special meeting before the next ordinary meeting.

9. A report of the Penal and Ethical Cases Committee was considered.

10. The Council decided to recommend to Government that the title F.S.M.F. (Bengal) granted by the State Medical Faculty of Bengal be recognized as an additional qualification registrable under section 21 of the Bengal Medical Act, 1914.

11. The proposal for revision of the Appendix to the Annual Medical List (Ethical suggestions, etc.) moved by Sir Kedarnath Das, Kt., C.I.E., M.D., F.C.O.G., was referred to the Penal and Ethical Cases Committee.

12. On an application from the Registrar, Andhra University, it was decided that a report be made to the local government under section 18 recommending that the M.B. B.S. degree of that University be recognized as registrable in Bengal.

13. Entry under section 21 of the Act of the qualifications D.T.M. (Liverpool) against the names of Dr. Mohinimohan Ghosh and Dr. Aminuddin Ahamad and D.T.M. & H. (London) against the name of Lieutenant-Colonel M. Das were approved.

14. With regard to the entry of the qualification D.B. (London U.) against the name of Dr. Ganapati Panja it was decided that an enquiry be made of the London University whether the diploma was one similar to that of D.O., D.O.M.S., etc., granted in the United Kingdom.

15. A statement of actual income and expenses of the Council during the year ending 31st March, 1934, was recorded.

16. The report on the audit of the accounts of the Council during the year 1933-34 was recorded.

17. The consideration of an application from Dr. R. Trey, M.D. (Cologne U.), for entry of his name under section 18 of the Act was postponed.

THE FORTY-FOURTH CHEMISTS' EXHIBITION, LONDON

THE forty-fourth exhibition will be held from 23rd to 27th September next in the new hall of The Royal Horticultural Society, Westminster, S.W. The management, 'The British and Colonial Pharmacist', is always pleased to welcome members of the drug trade from overseas and they are admitted on presentation of a business card. The exhibition—which in size and comprehensiveness is unequalled in the world—presents the latest products and attracts a very large attendance from chemists and druggists and all interested in the distribution of chemists' goods. Solely for the trade, it reflects the advance in the previous twelve months.

THE FIRST INTERNATIONAL BLOOD-TRANSFUSION CONGRESS, ROME

THE first international blood-transfusion congress will be held in Rome from the 26th to 29th September next.

For further information applications should be addressed to the 'Segreteria del 1° Congresso della Transfusione del Sangue, Via Palermo, 1, Milano, Italy'.

THE CALCUTTA DENTAL REVIEW

WE have just received the first issue of this new periodical.

The number of journals devoted to medical matters already appearing in India is very large but this one need have no fear of not being appreciated for it opens up an important field of medical science in this country, as it is to be devoted wholly to dentistry. In

recent years the influence of dental disease as the main aetiological factor in many general diseases has been much more widely appreciated, so that we as medical men have come to rely on the help of our dental colleagues in the cure of a large number of conditions. The natural effect of this is that the two professions (medical and dental), at one time looked on as more or less distinct from each other, are becoming much more closely allied in their efforts to cure and prevent human illness. As a consequence we welcome the publication of *The Calcutta Dental Review* both for itself and for the promise of help that it holds out to us as medical practitioners.

The journal is well produced and clearly printed and it contains a series of well-written and interesting articles. If the standard of the first number is maintained we predict an ever-increasing circulation for it and have much pleasure in welcoming this addition to our medical literature. The Calcutta dentists have previously given ample evidence of their energy and keenness in trying to improve the status of their profession, and we heartily congratulate them on this further evidence of their activity and wish their newest venture all success.

INDIAN MEDICAL COUNCIL

In pursuance of sub-section (2) of section 9 of the Indian Medical Council Act, 1933 (XXVII of 1933), the Governor-General in Council is pleased to appoint Lieutenant-Colonel G. T. Burke, M.D., B.S., F.R.C.P. (Lond.), I.M.S., to be the Secretary of the Medical Council of India, with effect from the 9th May, 1935. He is placed on foreign service under the Medical Council, with effect from the same date.

Current Topics

The Prevention of Disease in Infancy

By WILFRED PEARSON, D.S.O., M.C., M.A., M.D., F.R.C.P.
(From the *Journal of State Medicine*, Vol. XLIII, April 1935, p. 204)

DISEASES in infancy chiefly affect two systems, the digestive and the respiratory.

Throughout infancy the prevention of disease depends more upon feeding than upon any other factor, and no single preventive measure is of such importance as breast feeding. This is true in spite of the fact that the risks of artificial feeding have been diminished a good deal by the intelligent methods in use nowadays. Breast milk not only supplies all that is needful for the infant in the first eight months of life, but supplies it in a form which is most easily digested and utilized by the infant. It contains all the necessary salts and vitamins. If feeding is not possible for the eight months, six months will be a great advantage; but perhaps it is the first three or four months that matter most, and every effort should be made to feed the infant on the breast, if only for a limited time.

Nowadays iron and orange juice are sometimes advised as a routine for babies at the breast; these should not be necessary, and may upset the infant's digestion. If extras are to be given, it is to the nursing mother that they should be administered.

Cow's milk, modified to some extent, is the best substitute for the breast. Dried milks represent an advance in infant feeding; they are more digestible, keep well, and are free from infection. In all diets food should be given at regular intervals; the ingredients should be reasonably balanced as regards fat, sugar and protein; sufficient salts must be given in as natural a form as possible; and all the vitamins must be represented.

One of the chief faults in the past has been to use too high a proportion of fat; if this fault is continued with excess sugar (often provided in an unsuitable form) illness and inanition may result.

The commonest disorder of the alimentary system and one of the chief causes of infant mortality is diarrhoea. There has been a reduction of more than one-third in the mortality from this disease in the past 40 years; and factors in this improvement have been better education in the principles of infant feeding and cleanliness in the handling and distribution of milk.

It is by encouraging these safeguards that we may hope still further to reduce the incidence of diarrhoea, but valuable as they are none of them is such a safeguard as is breast feeding.

Scurvy is prevented by giving the infant orange juice to make up for any lack of vitamin C in the milk, whether dried or fresh. Nowadays scurvy is met with chiefly as a result of the use of milk which has already been pasteurized and is then boiled again in the home, of stale milk, and of certain kinds of 'infant food'. The amount of orange juice needed varies from three teaspoonfuls to six or eight; if the larger dose is needed it is best divided into three or four doses, as one large dose may cause indigestion.

When the infant has reached the age of nine or ten months and potato can form part of the diet much less orange juice is needed. Raw fruit and green vegetables are an advantage as laxatives and purveyors of valuable salts and should be given in addition to potatoes; but excess of them should be avoided, as they may cause indigestion.

Among the preventable diseases of infancy rickets was formerly one of the least often prevented. Though probably ill-balanced dietaries (especially excess of starch), lack of exercise, and impure air are contributory factors, the main cause of rickets is lack of

vitamin D in the diet. Rickets can therefore be prevented by providing foods, at first for the mother and later for the child, in which this vitamin is abundant, *viz.* milk, butter and eggs. It is safer to give to all artificially-fed infants some special preparation of this vitamin.

We know that sunlight acting on the skin creates a chemical substance similar to, if not identical with, vitamin D; natural and artificial sunlight are therefore adjuvants in the preventive treatment of rickets.

It is probably true to say that of all the vitamins, vitamin B is the least likely to be deficient, as it is present in so many different foods and is so little likely to be destroyed by any ordinary cooking process. Nevertheless at times it has to be specially provided as an extra for children who are not thriving or gaining weight.

Deficiency of salts must certainly be an important feature in producing ill-health and lack of resistance to infection, and it is important to provide the infant with some form of wholemeal flour, and to see that vegetables are properly cooked and that all the goodness of them is not, after cooking, thrown down the drain.

The supply of iron may fail after six months, particularly in the breast fed, and it may be necessary to give iron as medicine or in vegetables to counteract this tendency.

Prevention of dental caries should probably begin when the teeth are still forming in the jaws and are undergoing hardening or calcification. The better the tooth at the time of eruption, the better can it withstand decay. Attention should be given to the maternal diet, since teeth begin to calcify at the fifth month of uterine life.

There is little doubt that cleaning the teeth is important, as sticky foods tend to collect about the neck of the tooth and erode it externally. Food which encourages mastication and has a cleansing effect also is indicated theoretically, and it is often advised that the meal should end with raw apple, but common sense is needed in judging how far this is practicable, for often chronic indigestion is produced by giving food in this way.

We next come to infectious diseases, and since most infection enters through the mouth and nose, *i.e.*, is breathed, it is important to try to do all possible to stop the development of adenoids, tonsillitis, and unhealthy conditions of the nose, for the mucous lining represents the first line of defence against disease.

Active or interfering measures are not necessary; nasal breathing is to be encouraged and the use of dummies, for this reason, is taboo, and later on all children should be taught nasal breathing, breath holding, and proper breathing exercises to help to keep the nose, throat and lungs in a healthy condition.

The remaining efforts should be directed to conditioning the air indoors and to avoiding especially too moist or too dry a condition.

In damp and cold winter climates the strain put upon the linings of the nose and throat is severe, *e.g.*, as when coming out from a hot room into the cold, damp air.

I must also enter a plea, as much for your health's sake as for the infant's, to encourage the proper conditioning of air in public places and that steps be taken to attack this, one of the many problems which civilization and city life have created, *e.g.*, the fouling of the atmosphere with emanated heat and moisture of human beings crushed together with tobacco smoke and petrol exhaust fumes and fog.

This problem is of vital importance to the health, and I must mention again the importance of good food, adequate ventilation with moving air, and proper evacuation by bowel, skin and kidneys as general measures for keeping the child in good condition and able to overcome incidental infection, whether colds, pneumonia, or special forms of fever, such as measles.

Tuberculosis presents a special problem. There are two sources of infection, *viz.* (i) the inhalation of

infected sputum of an adult, and (ii) the drinking of infected milk, which is more common.

Prevention of infection by milk can be accomplished by boiling or pasteurizing, or T.T. milk can be used.

Children should also be shielded from adult infection, but this is one of those hopeless gaps in preventive medicine that need filling up. It should be a rule that no known actively tuberculous adult should be in a house where there are children. Since whooping-cough and measles are so often a predisposing cause, proper convalescence and tonic treatment are matters of importance.

Vaccination against smallpox is a preventive measure of indisputable value and should be adopted for every infant unless there is some special reason to the contrary. Sometimes it may be postponed until the child is two or three months of age, if he or she is frail, and there are feeding difficulties.

In conclusion it is necessary to mention that the needs of the brain and nervous system must not be overlooked. Sufficient sleep, careful and suitable feeding, plenty of fresh air, enough sunshine, and protection from excessive stimulation, whether due to noise or to light, are all called for. Other items of importance are proper attention to the skin, with bathing in warm or tepid water daily, and hygienic garments. Clothing should be loose, ventilated, soft and warm. Overclothing makes the body too hot and the skin unhealthy; it tends to weaken rather than to strengthen the child's resistance, though, of course, in the case of feeble twin infants sufficient warmth is most essential.

Finally, it may perhaps be useful to refer to two points which properly belong to the obstetrician, *viz.* twilight sleep and the diet of the expectant mother. Both, however, affect the health of the infant to a degree which brings them within the scope of this lecture.

With regard to twilight sleep there is sometimes a temporary feebleness of vitality in the newly-born state, sometimes sufficient to endanger life. Therefore the advisability of using this method as a routine may be regarded as open to question.

With regard to diet, no special diet is indicated for the expectant mother; she should take a well-balanced, normal diet, and if it contains sufficient milk, butter, green vegetables, fruit, eggs and potato, this will certainly provide all the beneficial ingredients necessary, salts and vitamins included.

In the last 40 years, curative measures have improved and have contributed to the saving of life, but the fall of infant mortality to nearly one-third of the figure at the beginning of this century has been largely accomplished by preventive measures. Continued dissemination of a knowledge of the elementary factors of infant hygiene should help still further to improve the standard of health in infancy and thereby lay the foundation for a healthier adolescence.

Ovarian Hormone Therapy

Review on an address delivered by Professor Aschheim at the meeting on 17th December, 1934, of the Medical Union of Luisestadt, Berlin

ALMOST simultaneously with the spreading of the knowledge regarding the cyclic changes of the uterine endometrium, the first research work concerning the female sexual hormones also commenced, after the internal secretory function of the ovaries had been ascertained by means of castration and transplantation of animal ovaries. The biological effect of the female sexual hormone and the method of standardizing were ascertained by experimental tests on rodents. Corner and Allen were the first to discover the existence of the second female sex hormone, the corpus luteum hormone, and that realizing it served the purpose of preparing for and maintaining pregnancy (gestation), they called it 'Progesterin'. Later on when purified hormone preparations were manufactured, these research workers succeeded in producing a true menstruation

in castrated female monkeys. The climax of experimental research, however, was reached when Kaufmann succeeded in proving that the effect of the two ovarian hormones 'Progynon' and 'Proluton' (progynon: follicular hormone, proluton: corpus luteum hormone) alone were sufficient to cause menstruation, as with the help of these two hormones he was successful in producing true menstruation in women, either castrated or suffering for years from amenorrhœa.

Only a few years ago ovarian deficiency was treated with extracts prepared from animal ovaries, without considering the fact, whether the animals were in a period of œstrus or not. The hormone contents of these organic ovary preparations, therefore, used to vary and were often practically nil. Nevertheless, in many cases of climacteric disturbances treated with such preparations there was remarkable therapeutic success. This is not very surprising as, since pure and standardized hormone preparations are produced, it is a well known fact that particularly during the climacteric age very small quantities of follicular hormone may suffice to do away with any disturbances. In severe cases, especially for nervous patients, a higher dosage from 5,000 up to about 50,000 international units daily (5 international units are equal to one mouse unit 'Sehering') should be administered either by mouth or by means of injections. The effects of high dosages of progynon B in oil are very remarkable. Serious menopausal troubles like vasomotor disturbances, unbearable headache as well as climacteric neuralgia of the pelvis and arthropathia can very often be obviated for a longer period by giving one or two injections of 50,000 international units of progynon B in oil. Skin diseases, particularly those found to be irresponsive to every other therapy like kraurosis vulvæ, pruritus vulvæ, vaginal ulcer of unspecific origin (observed by Kaufmann), acne rosacea, psoriasis and certain forms of eczema often respond excellently to progynon B in oil.

In cases of menstrual disturbances (amenorrhœa, oligomenorrhœa and dysmenorrhœa) Aschheim also recommends commencing treatment with peroral administration of small doses (progynon dragées). Only if this treatment proves unsuccessful should progynon B in oil be given. According to the lecturer's experience in cases of amenorrhœa it is possible to produce menstruation in every instance by a combined treatment of progynon B in oil (follicular hormone) and proluton (corpus luteum hormone), provided the uterus is not entirely undeveloped. Even in such cases of primary amenorrhœa, in which the uterus was considerably under-developed, the treatment was successfully applied. Occasionally Aschheim produced menstruation lasting for several days in uteri no larger than the size of a finger joint. So far the spontaneous menstrual cycle could not be achieved, but Aschheim considers it very important if, even for mere psychic reasons, artificial menstruation is produced in women suffering from primary amenorrhœa, as they very often acquire an inferiority complex which can be banished by the fact of menstruation taking place.

Secondary amenorrhœa responds more readily to this therapy and frequently spontaneous menstruations were observed following treatment with progynon dragées or progynon B in oil without proluton. As an explanation of the occurrence of spontaneous menstruations after progynon therapy, Aschheim points out that progynon also influences the anterior pituitary lobe.

According to Aschheim progynon has a decidedly favourable effect on the whole organism and increased intellectual efficiency as well as an improvement of the bodily and psychical condition of patients are repeatedly noticed after treatment with progynon. A full explanation for these facts has not been found as yet and it would be interesting if systematic research on the part of neuro-pathologists could be directed here.

The therapeutical application of proluton is rather limited compared with progynon. Aschheim mentioned that it is successfully used as a prophylactic against habitual abortion and in the treatment of

glandular-cystic hyperplasia (metropathia hæmorrhagica). It was expressly pointed out that, due to the fact that Butenandt succeeded in producing synthetic corpus luteum hormone, it is hoped that production on a large scale and at lower cost will be possible in the near future.

In regard to the therapy with gonadotropic hormones, Aschheim, who is one of the discoverers of these hormones, expressed rather sceptical views. He said it could not be denied that these hormones may do harm to the follicular system of the ovaries, unless it becomes possible to separate for practical application the two synergetically acting hormone parts of the anterior lobe, i.e., the hormone 'A' responsible for the ripening of the follicle and the hormone 'B' influencing the development of the corpus luteum. For many years Aschheim has, therefore, always used for treatment of ovarian dysfunction only the chemically pure and exactly standardized ovarian hormone preparations progynon, progynon B in oil and proluton.

Vaginal Ulcer—A Consequence of Ovarian Hormone Disturbance—Cured by Hormone Therapy

By DR. C. KAUFMANN

Report on an address read before the Society for Gynecology in Berlin on the 20th July, 1934

THE patient is 33 years of age. It is noteworthy that the first menstruation took place only when she was 33. This belated menstruation indicates ovarian deficiency. Once the menstrual cycle set in, it was regular for 4 years, when the woman became pregnant and gave birth to a healthy child. After delivery, menstruation soon set in again and was regular for 2 years. Afterwards the woman fell ill. Large ulcers appeared, at first on the left hand, later also on the upper thigh and the breast. These ulcers healed only very slowly leaving big scars. Simultaneously considerable brownish discharge occurred from the vagina. Large ulcers in the vagina were discovered. For several months attempts were made to heal the ulceration by means of washing and cauterization. This treatment was not successful. When the patient was brought to our clinic the posterior part of the vagina showed an ulcer about an inch in diameter with hard edges. The base of the ulcer was red and elevated. Spirochaetes were not found. The Wassermann reaction was negative. The histological examination of a specimen cut from the ulcer revealed that it was non-specific. We were unaware of the cause of this ulcer.

It was remarkable, however, that the ulceration occurred simultaneously with amenorrhœa. As the gynecological examination of the uterus and vagina proved these to be normal, the amenorrhœa could only be explained as being due to ovarian dysfunction. When discussing the therapeutic treatment to be adopted we started from the supposition that possibly the ulceration in the vagina was caused by ovarian hormone disturbances and consequently the patient was treated only with high doses of the benzoic ester of the dihydro-follicular hormone (progynon B oleosum), local treatment being completely abandoned.

In October 1933, the patient was given during 23 days in all 600,000 mouse units of the above form of follicular hormone, i.e., 3 million international units. Five days after suspending treatment bleeding occurred for 3 days. During the course of treatment it was, practically speaking, possible to observe how the ulcer in the vagina faded day by day whilst prior to treatment it was an inch in diameter; after treatment, that is to say after 23 days, the size was reduced to a small speck. Three months later the patient returned for a final examination. Menstruation had taken place meanwhile twice at regular intervals, the appearance of the vagina was quite normal. After a further 6 months the patient returned to the clinic and made the statement that—

'After our treatment, menstruation had been regular for 5 months, the next expected menstruation, however, failed to occur and, shortly afterwards, brownish-coloured discharge came from the vagina. Two ulcers were found this time in the vagina, one very nearly in the same position as the former ulcer, a second one in the vaginal cavity'.

Also this time an attempt at local treatment outside the clinic proved unsuccessful. We have treated the patient for the new ulceration only with this hormone and not locally. 600,000 mouse units (3 million international units) were administered in 24 days. After treatment, the ulcers healed completely. The patient, carried out after some time showed the vagina in a perfectly normal state.

Conclusion.—We have discovered a new kind of ulceration in the vagina so far unknown which, we consider, is due to ovarian hormone dysfunction. After unsuccessful attempts to heal the ulcers by applying local treatment, we have been able to cause the ulcers to disappear within a very short time by administering a sufficiently high dosage of follicular hormone, viz, 'progynon B in oil'. Our observations are not only interesting because they concern a rare case, but it seems that this particular case opens a so far unknown field of new indications for ovarian hormone therapy in the treatment of vaginal diseases.

The Criteria of Cure of Gonorrhœa in the Male

By AMBROSE J. KING, F.R.C.S. (Eng.)

(Abstracted from the *Journal of the American Medical Association*, Vol. CIV, 19th January, 1935, p. 178)

THERE is no phase of the management of cases of gonorrhœa that gives rise to more anxiety to the clinician than the period of probation preceding the decision as to cure. There are few errors that may be fraught with such disastrous consequences to the patient and his family, and to the reputation of the doctor, than an error in this important decision. Yet only too commonly it is found that, without adequate thought and without careful observation, this heavy responsibility is readily and lightly accepted.

In the time at my disposal I propose to enumerate the various points that must be considered in approaching such a decision, to give my views based on clinical observations in conjunction with certain improved pathologic tests, and to provoke discussion of those controversial points by which new light may be thrown on this old problem.

The tests of cure may with propriety be divided into two chronological groups, the classic and the modern. The classic group of tests are in the main clinical and imply a searching physical examination of the lower urogenital tract. Briefly, the requirements are an absolutely clear urine both by gross and by microscopic tests, negative endoscopic examination, absence of any evidence of inflammation in the urethra, testes, prostate and seminal vesicles, and a prostatovesicular fluid containing no organisms and not more than 5 white cells to the high power field. These requirements sound reasonable enough, yet it is my belief that a majority of patients affected with gonorrhœa cease treatment before achieving these classic standards of cure. Of those who measure up to these requirements many have been found, on follow up, to develop recurrences or metastatic lesions or to infect a sexual partner. It has become more and more obvious, as apparently cured cases are followed over long periods, that the classic tests furnish a most insecure index of cure. In the past many attempts have been made in the direction of greater accuracy in diagnosis of residual or latent infection; thus, the complement fixation and cultural methods are quite old—actually the complement fixation test was introduced in 1906. It is only in recent years, however, that intensive work all over the world

has led to the perfection of the complement fixation and cultural methods, thus providing a secure pathologic test of cure.

These modern tests demand a high degree of accuracy and experience on the part of the pathologist. They are of course complementary to the clinical tests and in no wise supplant them.

CULTURAL TESTS

Experience shows that cultural tests of the prostatic fluid alone are not reliable. Every effort should be made to obtain as much as possible of the contents of both prostate and seminal vesicles.

Much recent clinical and pathologic evidence points to the fact that infection of the seminal vesicles occurs in a considerably higher proportion of cases than is generally stated. A detailed discussion would be out of place here, but at least the careful microscopic and cultural examination of both fluids requires no extra effort and will give more accurate results.

The technic of culturing the gonococcus from the vesiculoprostatic contents in the chronic stage of gonorrhœa is due to the work of Dr. Orpwood Price, pathologist to the Whitechapel Clinic, and has been in routine use for the last two years. The procedure is as follows: The patient passes urine and the anterior urethra is then irrigated with sterile water. The patient assumes the knee-elbow position and the prostate and seminal vesicles are massaged thoroughly. As much as possible of the expressed fluid is allowed to drop on the surface of a culture medium contained in a Petri dish. The cover of the dish is replaced and the surface is slanted in all directions so that the greatest possible area of surface is inoculated. Before inoculation the medium is kept for at least half an hour in the incubator at 37.5°C. and is replaced immediately after inoculation. The culture is incubated for five days; it is premature to examine for gonococci before this period has elapsed. A variety of organisms may be present but the most constant feature is a profuse growth of *Staphylococcus albus*. Owing to the strong secondary growth, the gonococcus colonies may be difficult to distinguish without the use of a differential stain. For this purpose the oxidase reaction is employed.

The oxidase reaction was first used for differential diagnosis in bacteriologic work by Gordon and McLeod in 1928 and was adapted by Price to the isolation of the gonococcus in mixed culture in 1929. Briefly, the test depends on the interaction of the oxidizing ferments in certain organisms and in this case 1 per cent potassium permanganate solution in mine hydrochloride in distilled water, which produces a colour reaction. The solution should be freshly prepared.

This solution is poured over the surface of the medium so that it comes into contact with all the surface growth. A positive reaction is shown by certain colonies developing a pink coloration, which deepens through shades of purple to jet black in about thirty minutes. These colonies can then be picked off and stained by Jensen's modification of Gram's method, when they will be seen to consist of Gram-negative diplococci morphologically indistinguishable from gonococci. These are always closely associated with staphylococci, which in the first three days of incubation mask but do not inhibit their growth. Indeed, one of the most interesting features of cultures prepared and examined in this way is the appearance that is constantly seen of the gonococcus colonies growing up through the larger colonies of *Staphylococcus albus*.

The oxidase reaction is not, of course, a specific test, and other members of the neisserian group give a positive reaction. Of these only *Micrococcus catarrhalis* gives a closely similar reaction; but this organism is rarely found in the genital tract.

False positive reactions are usually given by a thin filiform type of *B. coli*, as well as by *B. subtilis*, but

these are easily distinguished by microscopic examination of the organisms when picked off the plates. If difficulty arises it is possible to make an antigen from subcultures and to titrate against a known antiserum.

Culture tests carried out according to this technic have proved most reliable and most informative. Its routine use throws light on many clinical points that have been obscure hitherto, and there is no doubt that it constitutes a very considerable advance in the methods of diagnosis of gonorrhoea in the chronic stage. As a test of cure it is invaluable.

It must be emphasized that one negative test is never sufficient and, although this cultural examination has proved to be the most delicate and reliable of tests, it can be accepted as a criterion of cure only in conjunction with negative clinical observations and the other negative pathologic tests.

In our test of cure we apply this test monthly during the period of observation without treatment. A series of four negative tests would be the minimum that could be regarded as satisfactory. In a series of 100 patients without symptoms the test was positive in 100 per cent. What evidence have we for asserting that the Gram-negative diplococcus which we recover in our cultures is the gonococcus?

Apart from the skill and experience of our pathologist, the evidence is threefold:

1. The oxidase reaction within the limits I have indicated is specific for this type of organism.
2. The titration of an antigen made from subcultures of the organism against a known gonococcus antiserum will give a positive result to the complement fixation test.

3. We make every endeavour to examine and test the husbands of married women who attend our clinic for vaginal discharges which are clinically and bacteriologically gonococci.

It is a frequent experience that the husband of such a patient has no signs or symptoms of gonorrhoea but gives a history of urethritis some years previously. In such cases we are able, almost invariably, to recover this organism in vesiculoprostatic culture.

THE COMPLEMENT FIXATION TEST

The complement fixation test for gonorrhoea is an invaluable aid in all stages of the management of gonorrhoeal cases.

In 1933 Price introduced a new antigen and improved the technic by using more concentrated serum. As the result of his work the sensitivity of the test is much improved and its value as a criterion of cure is enhanced.

False positives by 'cross-fixation' for practical purposes do not occur and we find that a positive reaction in the serum of a patient who has not been treated with gonococcus vaccine is an absolute indication of a persistent focus of infection with the gonococcus.

In a series of cases treated with gonococcus vaccine it was my experience that when cure could be established the complement fixation test became negative within six weeks of the cessation of vaccine administration. A positive result after this interval invariably indicated residual infection.

On the other hand a negative serum result to the complement fixation test, even in the symptomless patient, can never be accepted as reliable evidence of cure or anything more than a sign of good progress and efficient drainage. In many cases we are able to demonstrate the gonococcus in the secretions long after the test has become and has remained negative.

Some variation in the strength of the fixation test is to be expected in the period that precedes cure, and no single negative reaction should be regarded as conclusive serologic evidence. It is our custom to perform the test at the beginning and at the end of our period of observation and testing. It is a common experience that, when treatment is prematurely discontinued and the patient remains under observation,

the fixation test will again become positive, thus indicating a persistent focus of infection.

A provocative diet including alcohol is of assistance in the final stages. I have had no satisfactory results from provocative injections of vaccine or from provocative urethral instillations.

SUMMARY

1. No investigation as to cure need be undertaken in the gonorrhoeal patient who has a persistent urethral discharge or whose urine shows evidence of infection. To this main principle there may rarely be exceptions.

2. Palpation of the prostate is seldom of much assistance in the treated case. Palpation of the seminal vesicles is likely to give some positive information, but this is of little value when vesiculitis has been recognized and treated.

3. The macroscopic examination of the vesicular fluid and the microscopic examination of the vesicular and prostatic fluids are of great importance. Unsatisfactory microscopic tests are strong evidence against cure.

4. Vesiculoprostatic culture by Price's method constitutes an important advance in accurate diagnosis. The test repeated at monthly intervals over a period of time constitutes the absolute criterion of cure when all other tests have proved satisfactory.

5. Recent improvements in the complement fixation test for gonorrhoea have increased its sensitivity and enhanced its value in testing for cure.

6. A positive serum result in a patient who has not received injections of gonococcus vaccine within the preceding six weeks is reliable evidence against cure.

7. Negative blood serum results on successive occasions in the course of treatment are evidence of efficient treatment but not necessarily of cure.

8. A provocative diet, including alcohol, is sometimes of value as a preliminary to the final series of tests and should be employed.

CONCLUSION

Let me review the evidence against cure in a clinically well patient. A negative complement fixation test may merely mean efficient drainage; it can and does occur when even smears are positive. What is the meaning of repeated positive cultures? I feel that while striving for accurate and infallible criteria of cure, we have arrived at the unenviable position of having apparently proved that cure is very much more difficult of achievement than is generally realized.

Further, it appears that the clinically well patient, having established a biologic equilibrium with his gonococci, retains the power of transmitting virulent infection to his sexual partner. Despite the work, time and thought given by us to this subject, I do not feel that we have arrived at conclusions which warrant more definite formulation. I do feel, however, that we have been able to establish the fallacies of previously accepted standards of cure. This paper is presented as an account of the work of the White-chapel Clinic up to the present, so as to set forth our observations and difficulties and in the hope of enlisting co-operation and help in the work that lies ahead in the attack on the bristling problems of this ancient social menace.

The Significance and Treatment of Cough

By J. BROWNING ALEXANDER, M.D., M.R.C.P.
(Abstracted from the *Practitioner*, Vol. CXXXIV, January 1935, p. 83)

THE TREATMENT OF COUGH

THE treatment of cough naturally depends upon a correct diagnosis having been made. The indiscriminate use of cough mixtures is often harmful, as it may tend to mask the true underlying cause. It is very common to meet with patients who have for

many months or even years been content to have their cough kept in check by some soothing cough mixture, only to have discovered later well advanced pulmonary disease, which, had it been detected in its early stages, might have yielded to treatment.

When dealing with the treatment of cough from what may be called local causes, it is obvious that a cough due to enlarged tonsils and adenoids must be treated surgically—by removal of the tonsils—and adenoids. Again, the long uvula may be cut, though once more it is important to realize the danger of making this diagnosis before other causes have been carefully excluded. For the pharyngitis, which is often secondary to dyspeptic conditions, remedies liable to correct the latter and possibly advice to the patient regarding diet, avoidance of alcohol or tobacco in excess will be the best methods of dealing with the pharyngeal cough.

In laryngitis, however, and tracheitis, relief can usually be obtained by a mixture to lessen congestion of the inflamed mucous membrane and promote secretion and thus lessen the painful character of the cough. Such a mixture as the following is of value:—

R̄ Sodii bicarbonatis	..	gr. xv
Tincturæ ipecacuanhæ	..	℥ viiss
Syrupi toluani	{ aa	.. ℥ xxx
Syrupi scillæ		
Spiriti chloroformis	..	℥ x
Infusum senegæ ad	..	℥ i

One ounce every 4 hours until the sputum has become free.

For this condition also inhalations are useful. The following are examples:—

R̄ Tincturæ benzoini	Sixty minims to the pint of
compositæ.	water.

Or to this may be added:—

Three minims each of menthol and oil of eucalyptus.

Another remedy which is of value for relieving the cough of laryngitis and tracheitis is the application round the neck of antiphlogistine or warm olive oil.

In the early stages of bronchitis, when the cough is troublesome, painful and non-productive, the same mixture as recommended for laryngitis may be used with benefit. The following mixture is also useful:—

R̄ Vini antimonialis	..	℥ xv
Ammonii chloridi	..	gr. x
Spiriti chloroformis	..	℥ x
Syrupi aurantii	..	℥ lx
Aquam camphoræ ad	..	℥ i

This should also be discontinued, probably after two or three days, when the sputum becomes free.

The cough which is a feature of the later stages of bronchitis, when expectoration is copious, calls for drugs which are of the stimulating expectorant type—a mixture such as the following is of use:—

R̄ Ammonii carbonatis	..	gr. v
Tincturæ nucis vomicæ	..	℥ viii
Tincturæ scillæ	..	℥ xv
Aquam ad	..	℥ i

or alternatively—

R̄ Ammonii carbonatis	..	gr. v
Tincturæ scillæ	..	℥ xv
Tincturæ opii camphoratæ	..	℥ xx
Infusum senegæ ad	..	℥ i

A very useful prescription for children suffering from a cough which is just becoming loose is the following:—

R̄ Tincturæ ipecacuanhæ	..	℥ ii-v
Tincturæ opii camphoratæ	..	℥ v-x
Potassii nitratis	..	gr. ii
Oxymellis	..	℥ xxx-lx
Aquam ad	..	℥ cxx

With regard to the cough of pulmonary tuberculosis the treatment of it will depend upon whether it be of

a useful or useless type. In the case of the latter, the patient can often be trained to suppress the act, but in these circumstances it is necessary to prescribe some sedative drug, especially when the useless cough prevents sleep. Such a mixture as the following is worthy of trial.

R̄ Heroin	..	gr. 1/12
Syrupi pruni virginianæ	{	℥ xxx
Syrupi codeinæ		
Aquam ad	..	℥ ss

or the following prescription may be found even better:—

R̄ Heroin	..	gr. 1/12
Codeinæ	..	gr. 1/8
Acidi sulphurici diluti	..	℥ ii
Glycerini	..	gr. x
Syrupum toluatum ad	..	℥ lx

For this type of cough dry inhalations are often of use and for this purpose the most useful drugs are creosote, menthol and rectified spirits in the following proportions:—

R̄ Menthol	..	℥ lx
Creosot	..	℥ lx
Spiriti vini recti	..	℥ ss

A few drops sprinkled on a mask and inhaled for a few minutes has often a soothing effect.

When, however, the cough is useful, in as much as expectoration has to be brought up every endeavour must be made to loosen it—and here, as in the case of bronchitis, ammonium chloride and antimony are invaluable. The prescription already detailed for the early stages of bronchitis may be used in this case also.

When one is dealing with fibrosis of the lung, either due to pulmonary tuberculosis or other causes, the cough is usually associated with marked dyspnoea and often is in great part caused by failure of the right ventricle of the heart. Therefore relief will be better obtained by given cardiac tonics, such as digitalis, nux vomica, than by sedative cough mixtures. Some such prescription as the following is in common use:—

R̄ Tincturæ digitalis	..	℥ v
Ammonii carbonatis	..	gr. v
Tincturæ nucis vomicæ	..	℥ v
Spiriti chloroformis	..	℥ x
Aquam ad	..	℥ i

In some severe cases Nativelle's granule 1/600th two or three times a day may prove successful in diminishing the cough.

Belladonna is of definite use in the treatment of certain types of cough in which an anti-spasmodic effect is desired. The following prescription may be taken as an example:—

R̄ Tincturæ sambul	..	℥ xv
Tincturæ stramonii	..	℥ x
Tincturæ belladonnæ	..	℥ v
Spiriti chloroformis	..	℥ xv
Aquam ad	..	℥ ss

Finally it may be again emphasized that the successful treatment of cough will depend upon a correct diagnosis of its cause having been made.

Recent Trends in Diphtheria Prophylaxis

By J. C. SAUNDERS

(From the *Irish Journal Medical Science*, March 1935, Sixth Series, No. 111, p. 117)

In this paper I am confining myself entirely to our own experience in Cork City, which now extends over a period of practically five years and embraces observations on some 12,000 children who have passed through our hands in that time. The amount of

material and the duration of the period under review induce a certain amount of confidence in expressing opinions which have been wanting hitherto. I do not propose to go into details but will confine myself to a more or less broad statement of the observations on which our present procedure is based, except in such as those in which a more detailed examination appears to be necessitated.

A number of different prophylactics have been on the market, and in assessing the values of these it seems to me that the best way of approaching a solution is to consider what I may term our apparent failures and to examine their relationship to the particular antigen used. When we commenced immunization the prophylactic of choice was toxoid-antitoxin, which was favoured because of its good antigenic power and the complete absence of any serious after-effects which has always been associated with it. This was the prophylactic favoured in England and the United States, while Ramon's anatoxin (which must be distinguished from the more recent formol-toxoid) was most in use on the Continent. There has been little to choose between these prophylactics.

In the course of time there began to crop up amongst the children treated by us cases reported as suffering from diphtheria. We are fortunate in Cork in this respect that we are a fairly large but compact population, and, therefore, it has been comparatively easy to exercise supervision over suspects. Careful records have been kept of every such case and we have learned a great deal from them.

It is necessary at this stage to go into a few figures, and I have to stress that these relate only to the end of 1933. We have not yet had the time to analyse fully those of 1934, which I may state have been the best for any year so far as regards numbers treated and results are judged by the Schick test. There is no doubt, therefore, that when they do come to be included they will influence the total results in an even more favourable light. So far, the total number of treated cases who have been reported as suffering from diphtheria amounts to 132. Of this number, 92 are excluded from the computations, as in 69 of them the diagnosis was not confirmed and in 23 treatment was incomplete. This leaves a residue of 40 cases which we have to consider in a little further detail. Of the 40, two were primary negative Schick reactors, and 13 secondary negative reactors (i.e., after undergoing a course of treatment). There were, therefore, 25 who had not been Schick-tested after treatment, and the essential criterion of a successful course of treatment is a negative Schick reaction after such a course. Properly speaking, such cases should, therefore, be excluded on this ground.

Of the two primary Schick-negative reactors there is little to be said. It is well known that the liability of natural immunes (as judged by the Schick test) to relapse is very slight indeed. Our two cases represent a proportion of 0.13 per cent of the total known negative reactors in this category (or slightly more than 1 in 1,000), but the proportion to the total natural immunes in the whole population must be very much smaller. The 13 secondary Schick-negative reactors occurred amongst a group of 3,402 children who completed the full course of treatment and underwent a subsequent Schick test. This represents a proportion of 0.38 per cent (or 3 per 1,000), but here again the figures are fallacious, as a very considerable number of children who underwent the full course failed to present themselves for the final test. The actual number of such cases was 4,058 and, since our experience over five years has shown an average of 90 per cent of treated children to be negative, it must be assumed that at least 3,650 of this group were negative. These added to the known negative reactors make a total of 7,054 who were presumably negative, and 13 relapses amongst this group represents a proportion of 0.18 per cent. The number of relapses amongst the non-tested group (7,460 cases) was 25, representing a proportion of 0.35 per cent. I may add that while this figure

includes all the relapses which occurred up to the end of 1934, they do not include the number of children dealt with in that year. The latter number some 3,000 and, if included, would have the effect of materially reducing these figures.

We have, therefore, three series of figures: (1) natural Schick-negatives, 1 per 1,000; (2) secondary Schick-negative reactors roughly 2 per 1,000; and (3) untested children, 3 per 1,000. The average incidence of diphtheria per 1,000 of the population over the past five years was 10.4 per 1,000, so that from this point of view it is apparent that although active immunization has not hitherto been absolutely effective, the liability of immunized children to contract diphtheria is very much less than that of non-immunized children. The figure for the incidence of diphtheria among non-immunized is, in reality, very much higher than indicated above and would be more clearly shown if the population could be divided into two separate groups, immunized and non-immunized. This was done in 1931 and it was then found that the incidence of diphtheria in untreated children was no less than 25.6 per 1,000 (as compared with 2.3 per 1,000 in the treated groups). It is well, at this point, to emphasize the fact that so far, after some six years' experience of immunization, we have not had to record a single death from diphtheria among immunized children, who now comprise the relatively very large group of some 12,000 in Cork, notwithstanding the extreme virulence which has characterized the disease here for the past few years as evidenced by the fatality rates which have ranged from 15 to 22 or 23 per cent. During the same period 180 untreated children died from the disease.

Of the total 40 relapses with which we are now dealing, 34 occurred amongst children who were treated with toxoid-antitoxin and four amongst those treated with alum-toxoid; the remaining two had no treatment, being found negative on the preliminary test. What proportions these represent of the respective groups I have not been able to compute, but the relapses amongst alum-toxoid treated children have been relatively far less frequent than those amongst the other group. This question of relapses has been the subject of deep consideration amongst the producers of prophylactic agents and has led to a keen search for a more reliable antigen than toxoid-antitoxin. A number of such agents has been produced during the past few years and, in our experience, they have been so obviously superior to toxoid-antitoxin that we have now completely abandoned the use of that product. In what follows I will discuss the relative merits of these new antigens.

Alum-toxoid

In our hands this product has been very satisfactory indeed. Four relapses have been recorded, but it is necessary to point out that in two of them the batch used was the first produced. It was possessed of a very low *Lf* value and on further investigation was found to possess little or no antigenic power. It was withdrawn shortly after introduction (and after we had treated nine cases with it). One of the two remaining cases was ill three days before receiving antitoxin treatment, and when I saw him on the fourth day he was sitting up and had actually been out of bed and appeared to be none the worse for it. Obviously the infection in his case was of a very mild character. This case is of some interest. He was one of a number of boys who were affected in a very severe outbreak of diphtheria in a local school (in which two died) and had been sitting next to the acute carrier who caused the outbreak. In every one of these cases the organism was of the *gravis* type.

In the earlier batches of alum-toxoid unpleasant reactions and more or less marked indurations occurred in a number of cases. This difficulty now appears to have been largely overcome in the new alum-toxoid which has been issued by the Wellcome Research Laboratory, and we have been obtaining extremely good

results with a single dose. Whereas with toxoid-antitoxin one had to administer three doses and wait six months before testing, we now find that over 90 per cent of our cases are negative in five weeks after a single dose of alum-toxoid. This is, of course, an enormous advantage and I have no doubt that alum-toxoid will be the prophylactic of choice in the near future.

Formol-toxoid

In the interval between the withdrawal of the old alum-toxoid and its recent reintroduction there came on the market a new prophylactic under the designation of formol-toxoid (or F. T.). F. T. differs from the anatoxin or toxoid of Ramon in that it was prepared from a much more potent toxin as measured by the flocculation test. Mr. Pope, of the Wellcome Research Laboratory, was responsible for this antigen. The greatly increased potency of the original toxin from which it is prepared is due to improved methods of cultivating the diphtheria organism. In actual practice we have found this prophylactic to be highly satisfactory. Two injections at intervals of three weeks to a month are sufficient to induce immunity in over 90 per cent of cases as judged by the Schick test administered within six weeks of the last dose. The liability to reactions is, however, somewhat higher than with T. A. M., and it is not safe to administer it to children over eight years of age without a preliminary Moloney test to detect reactors. This is the accepted teaching, but I must say that in our experience we have had very few complaints. Of course, we have carried out the Moloney test where indicated, but still a good many older children have been treated without this test and the reactions do not appear to have been very much more frequent than with T. A. M.

F. T. is possessed of a very high degree of immunizing power, far greater than T. A. M., induced with much more rapidity and with two doses, which is of a great advantage. It is considerably cheaper than floccules and can be safely administered to any child of six years or under without fear of reactions. I have never seen reactions in children of these ages and have no hesitation in using it for them. We have been using this antigen for the past year and a half and have dealt with some 1,700 cases. So far we have had no relapses with it, but the time interval is still too short to judge of its merit in this respect. There is no doubt, however, that F. T. is a great advance on T. A. M.

Floccules

The prophylactic known under this designation, generally referred to as T. A. F., has been known for a number of years. When toxoid and antitoxin are mixed a flocculent precipitate is thrown down which has been found to be possessed of a high degree of immunizing power and constitutes the antigen now under discussion. From the point of view of freedom from liability to cause reactions T. A. F. is undoubtedly the best of all prophylactics so far produced, but its high cost has operated against its general use up to the present. Where expense is not a consideration it is the antigen of choice. Hitherto, it was thought that three injections were necessary, but now it has been found that two, properly spaced, are sufficient to immunize the great majority of cases.

The proper spacing of doses of prophylactics is a matter of considerable importance. For instance, let us say, that 1 cubic centimetre of a prophylactic will induce a certain degree of immunity (as measured by the amount of circulating antitoxin in the blood) in a given period, say twelve weeks, it has been found that if administered in two fractions, the second being given three weeks after the first, there is a very rapid acceleration in the formation of antitoxin after the second dose, so that the maximum amount is reached in six or seven weeks. Two doses of T. A. F. at intervals of three or four weeks are more effective than three doses at intervals of a week.

We have had a good deal of experience with T. A. F. over the past year in connection with the use of F. T.

Any children yielding a positive Moloney test are treated with this product and the results as judged by the subsequent Schick test have been universally satisfactory. Again, in this case the test is carried out six weeks after the last dose and, as in the case of F. T., there have been no relapses so far. But here again the remarks concerning the length of the time interval apply. It is too soon yet to judge, but one has the distinct impression, from this point of view also, that both of these antigens are a decided advance on T. A. M.

Summary

It is not possible to say with certainty what is likely to be the prophylactic of choice in the immediate future. One thing however is clear, viz, that the use of toxoid-antitoxin (T. A. M.) should be discontinued. To date one can say roughly that half of our cases have been treated with this antigen, while of all our relapses no less than 90 per cent fall into this group. Obviously, therefore, from the point of view of permanence it falls far short of the other agents. But these figures must be taken with caution, as the period over which the factors making for relapse have had time to act has been greater with T. A. M. than with the others. On this score, however, alum-toxoid has clearly proved far superior. One can, therefore, definitely recommend that T. A. M. should be dropped, and this has been the experience everywhere. Where alum-toxoid or floccules have not been adopted, T. A. M. has been completely supplanted by formol-toxoid.

As regards formol-toxoid, it can be used without hesitation in all children under six years. In the very few cases in which reactions occur they are invariably very mild and in such the second dose may be administered in T. A. F. (floccules). It is a very suitable antigen for such children and has the merit of cheapness and absolute freedom from toxicity. There is no toxin in its composition and, consequently, there is no liability to dissociation with the setting free of toxin which occurred with the old toxin-antitoxin (T. A. T.) and which caused a number of disasters on the Continent and elsewhere. T. A. T., of course, must be distinguished from T. A. M. which also has no toxin in its composition.

F. T. is possessed of somewhat higher antigenic power than T. A. F. (floccules) but, as stated above, where expense does not matter the latter is the antigen of choice. From the point of view of the private practitioner T. A. F. would appear to be the ideal prophylactic. Its high antigenic value and almost complete freedom from reactions mark it out especially in this respect. Two doses at intervals of a month or three weeks (instead of the three doses formerly recommended) are quite sufficient, and this fact materially reduces the cost of inducing immunity. In the case of adolescents and older people T. A. F. is the only antigen that can be recommended.

As regards alum-toxoid or, as it is now termed, alum precipitated toxoid (A. P. T.), the fact that a single dose is sufficient to confer immunity in the vast majority of cases is an overwhelming advantage and makes it a serious contender for choice in any circumstances. Two disadvantages have been urged against it: (1) the liability to cause serious reactions and (2) the tendency to the formation of indurations at the site of injection. As regards the former it can be said that with the new product this liability has been enormously reduced and that when reactions do occur they are definitely less than those formerly associated with the old A. M. T. With regard to induration, many observers regard this phenomenon as a very decided advantage. The efficacy of A. P. T. is dependent on the slow and continuous absorption of the antigen from the site of injection whereby there is a prolonged stimulus to the formation of antibodies in the tissues. This in its turn is due to the particulate matter, the precipitate, which holds the antigen in suspension in the case of alum-toxoid.

In the case of T. A. M., which is a perfectly clear solution, it has been shown that the first dose is almost completely eliminated from the body and with great rapidity, the second more slowly, while it is the third that acts as the main stimulus to the formation of antibody. The advantage of an antigen which is retained at the site of inoculation is at once apparent, and the whole rationale of alum-toxoid is based on this observation which was first noted in horses. It was found that a far more potent tetanus toxin could be produced by inducing a sterile abscess at the site of injection of the toxin. Tapioca grains were originally used, and eventually insoluble alum salts. The technique here evolved gradually came to be applied to human beings, almost entirely by the workers of the Wellcome Research Laboratories, and the result has been the modern high potency A. P. T., which holds very great promise indeed.

From the point of view of the public health worker endeavouring to immunize the maximum number of children it is alone in its field. Hitherto the leakage caused by cases failing to return for completion of treatment has been an almost insuperable hindrance to

mass immunization. This difficulty now appears to have been overcome, so that one can look forward with a high degree of confidence to the future that the effect of immunization on the general incidence of diphtheria will be much more marked than it has been.

To the private practitioner also, it would seem to me, the inherent advantages of a prophylactic such as A. P. T. must be very alluring. The induction of immunity by a single dose in the majority of cases is a factor that cannot easily be outweighed, but I would impress upon my readers that the A. P. T. I have in mind has only quite recently come on the market. In my opinion, the brands hitherto obtainable are not the same, and have been issued with undue precipitancy. I can testify to the extraordinary care and caution which have been exercised by the original producers of A. P. T., the Wellcome Research Laboratory, and to the enormous number of animal experiments which have been carried out in connection with it notwithstanding all of which, up to quite recent times, they have not been satisfied that they had produced an article suitable for general release.

Reviews

THE MEDICAL ANNUAL: A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX. Edited by H. L. Tidy, M.A., M.D. (Oxon.), F.R.C.P., and A. R. Short, M.D., B.S., B.Sc., F.R.C.S. Fifty-third Year. 1935. John Wright and Sons, Limited, Bristol. Pp. cl plus 600, with 141 text illustrations and 63 plates, plain and coloured. Price, 20s.

THIS annual review of recent advances in the medical sciences will be as welcome as it usually is, both to the practitioner, who has little time—or opportunity in most instances—to study current medical literature, and to the specialist, who usually has a myopic tendency which he is quite ready to correct when correction is made easy.

The year 1934 was not notable for any conspicuous advances, and the task of picking out sections for special mention is thus not made easy.

The heading *anæmia* is apparently reserved for pernicious *anæmia*, other *anæmias* being placed under blood diseases. The reason for this is not quite clear; though admittedly pernicious *anæmia* is not a blood disease, in that the blood is more sinned against than sinning, this is true of the majority of the other *anæmias*. [We hope that this favouritism shown towards pernicious *anæmia* will not increase the feelings of resentment that must already exist amongst the *anæmias* at the undue attention that has been paid to it during the last decade. However, let us remind them that nothing has done more to raise the status of *anæmias* in general than these investigations into the *ætiology* and treatment of 'p. a.']. There is little new to record this year, except that emphasis is being laid on the superiority of parenteral over oral liver extract. A liberal resumé of Wintrobe's paper on normal American standards is given. It is quite time that the older standards were entirely abandoned, as it is becoming increasingly apparent that, although the normal hæmoglobin may be less in Great Britain than in America, Haldane's figure of 13.8 grammes per 100 c.cm. is ridiculously low. Standards for India have still to be worked out, but it is certain that the normal hæmoglobin is above 13.8 grammes and that the 'thin' blood of the dweller in the tropics is a myth.

Attention is drawn to the obvious fact that iron will produce at any rate temporary improvement in 'splenic *anæmia*', as it will in any condition where there is loss of blood and consequent 'siderosis'. The writer in this section seems to think that in the past splenectomy has been undertaken rather too readily in

this condition. We do not agree, but we do consider that the surgeon who fails to give a course of large doses of iron before the operation is scarcely being fair to his patient. A paper on the indications for splenectomy is quoted at some length and there is a plate showing the technique of splenectomy; this plate is useful, but it will fill with envy the Indian surgeon who seldom has the pleasure of removing such a neat, non-adherent and moderate-sized spleen.

The advances in *anæsthesia* have been mainly in the technique of administration and in this section there are a number of useful illustrations of apparatus. Intravenous *anæsthesia* has obviously come to stay and some simple equipment for its easy administration will soon be an essential part of the general practitioner's equipment.

Some useful work on asthma is reported. The Therapeutic Trial Committee of the Medical Research Council have initiated investigations into the value of ephedrine and pseudo-ephedrine; the latter is of value mainly in alleviating minor symptoms and is of little value in the severe attack. Otherwise, the year has brought forth the usual batch of 'specifics'.

A statistical enquiry into the question of the increase of cancer is reported. The evidence points to an actual increase, but not to the extent that the crude death rates indicate. The greater part of this section deals with the radium treatment of cancer.

The use of the barbiturates in epilepsy is discussed at some length. Phenobarbitone is recommended on the grounds of cheapness. It is as effective as the proprietary preparations that were tried.

The work of Böhler of Vienna is influencing the treatment of fractures throughout the world and recently it seems to have captured the attention of British surgeons in particular. This influence is well reflected in this useful section on fractures in this book.

Thyroidectomy in heart failure can almost claim to be a new procedure. During the last two years a number of papers on the subject have been published; these are reviewed. So far the operation has been mainly confined to patients in whom the immediate prognosis was bad. Many of them have been much relieved.

Under the heading of hypnotics a few of the skirmishes in the battle of the barbiturates are reported. Whether the extreme pessimism of the two noble knights, Sir William and Sir James, is justifiable, time will presumably show, but meanwhile in Great Britain these drugs are placed in schedule II and cannot be

obtained except on the prescription of a doctor. It is alarming to realize that in India they can be purchased by the pound by anyone who has a troublesome relative with a toothache!

Statistics on the value of anti-pneumococcal serum are still piling up. Its value in type I, and to a less extent type II, strain infection seems to be firmly established. It is, however, depressing (for some of us) to read that serum treatment does little to lower the death rate in patients over 40 years of age; a time honoured 'friendship' is not therefore to be broken by modern therapy.

In the dietetic world vitamin A is having rather a thin time. Its reputation as an anti-infective vitamin seems to have been shaken by recent work; it is still claimed that in the case of actual deficiency infections, especially respiratory, are more frequent; but few diets appear to be thus deficient, and you can apparently eat carrots until your serum runs red and you will still get a cold in your nose.

Tropical diseases are as usual dealt with in a very satisfactory manner, by Sir Leonard Rogers. In the malaria section all the recent work on the synthetic anti-malarials, in India and elsewhere, is reviewed, as also is the entomological, epidemiological and parasitological work done under the auspices of the Indian Research Fund Association. There is reference to the report of the League of Nations' Malaria Committee and the criticisms that were voiced in this journal are repeated.

By way of conclusion we may say that this year's medical annual still provides the answer to the medical practitioner's question 'How can I spend twenty shillings to the best advantage to myself and to my patients?'

L. E. N.

GYNÆCOLOGY FOR STUDENTS AND PRACTITIONERS.—By T. W. Edon, M.D., C.M. (Edin.), F.R.C.P. (Lond.), F.R.C.S. (Edin.), F.C.O.G., and C. Lockyer, M.D., B.S. (Lond.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), F.C.O.G. Fourth Edition. By H. B. Whitehouse, M.B.M.S. (Lond.), Ch.M. (B'ham), F.R.C.S. (Eng.), F.C.O.G., F.A.C.S. (Hon.). 1935. J. and A. Churchill Ltd, London. Pp. xviii plus 964, with 36 coloured plates and 619 illustrations in the text. Price, 38s.

We are pleased to welcome the fourth edition of Edon and Lockyer's *Gynaecology* edited and revised by Beckwith Whitehouse. The general plan of the volume is unaltered but is entirely modernized. It is confidently recommended to the advanced student, the practitioner and to those who are studying for a higher diploma. It is an up-to-date, lucid and reliable work. The illustrations are numerous and clear; several new ones have been added. The number of coloured plates has been increased to thirty-five; they are beautifully executed. We would suggest, however, that suitable paper should be provided to protect them; we found some adherent to the opposite page. The printing and binding leave nothing to be desired.

More cosmopolitan views are given than are usually found in British textbooks. It is just possible that, in the endeavour to give the latest word on the physiology of the female sex organs and on disorders of menstruation, insufficient space is allotted to the full discussion of more urgent conditions. Ketogenic diet is not mentioned in the treatment of *B. coli* pyelonephritis. We think it is a pity that the differential diagnosis of many conditions should be grouped together in part IV and omitted altogether from the original heading. We feel that the description of any condition is quite incomplete without its differential diagnosis.

The terms, menostaxis and metrostaxis are introduced to supplement menorrhagia, metrorrhagia and epimenorrhœa. A chapter on contraception appears for the first time. We are pleased to see this subject definitely taken into medical hands; it is well and concisely dealt with. We beg to differ, however, with the statement

that the vaginal route gives adequate access for the sterilization of multiparæ. We have known of three women in whom pregnancy followed upon this procedure although the operations were carried out by a skilled gynaecologist. The section dealing with sterility is well done but we think that an unduly optimistic view is taken of the reliability of the results of insufflation of the tubes by air or gas.

Part III deals with regional gynaecology; it is excellent. Part V is devoted to operative gynaecology and proceeds on the same general principles as previous editions. There are certain additions which we are very pleased to see, such as the Manchester operation for prolapse. There is another which we do not welcome—the interposition operation for prolapse introduced by Wertheim thirty-six years ago. We have seen only unpleasant results follow upon this procedure—unpleasant for the operator as well as for the patient. We have therefore never performed it and consider that the warning issued by Graves on this subject should be added to every description of this operation. With this one exception, the operations described are reliable, amply explained and clearly illustrated.

S. A. McS.

MIDWIFERY.—By Ten Teachers. Under the direction of C. White, M.D., B.S. (Lond.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), F.C.O.G. Edited by Sir C. Berkeley, J. S. Fairbairn, and C. White. Fifth Edition. 1935. Edward Arnold and Company, London. Pp. xi plus 740. Illustrated. Price, 18s.

The fifth edition of *Midwifery by Ten Teachers* has appeared this time, under the direction of Dr. Clifford White. All important recent advances have been incorporated. It can be heartily recommended to those for whom the work was originally designed—students reading for their final examination and the busy general practitioner. It is clear, concise, easy to read, admirably printed and profusely illustrated.

There are only a very few points which we think need revision. We have never had any success with injecting saline through the umbilical vein as a means of separating an adherent placenta; the reason is that the placenta is partially separated and the saline runs out through the separated area. The necessity of taking a catheter specimen of urine for culture, as well as cultures from the cervix and from the blood, in the investigation of pyrexia during the puerperium is not mentioned. The dose of quinine recommended for induction of labour—30 grains in three hours—is, we think, at least twice too high and definitely dangerous. Like DeLee, we have found 5 grains (and in many cases 3 grains) every two hours for three doses quite as effective. There is a misprint on page 499; 'blood vessels are opened' should obviously read 'blood vessels are not opened'.

These few points are negligible in a work of general excellence which we have the greatest pleasure in recommending.

S. A. McS.

MANUAL OF PHYSICAL AND CLINICAL DIAGNOSIS.—By O. Selfert and F. Mueller. Authorized translation from the Thirty-first German Edition. By E. C. Andrews, M.D. Second Edition. J. B. Lippincott Company, Philadelphia and London. Pp. xi plus 561, with 152 illustrations and 5 coloured inserts. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 18-12

This is an English translation of the thirty-first German edition. The work needs no recommendation as numerous editions in different languages attest to the value of this compendium of diagnostic methods and data. The facts are presented in a clear and orderly manner. The subject-matter has been arranged to accord with the course that a student can easily pursue. Anatomical and physiological descriptions have been incorporated in appropriate places. Various clinical

methods, physical signs, chemical tests and data have been furnished with omission of the non-essential and obvious things. Concise accounts of parasites, infectious diseases, glands of internal secretion and metabolism have also been included. One section has been devoted to skin diseases. The appendix contains tables on poisoning, dosage, etc. The illustrations are good and explanatory. The book will greatly fulfil the needs of the physician and student at the bedside.

Few criticisms can be offered. Under 'spleen' kala-azar has been omitted as one of the causes of its enlargement. The list of causes of enlarged liver is incomplete. The statement that kala-azar is often fatal cannot be supported in these days of improved treatment.

R N C

MEDICINE. Part IV. Catechism Series. Third Edition. 1935. E. and S. Livingstone, Edinburgh. Pp. from 281 to 380. Price, 1s. 6d. Postage, 2d.

This little book deals with diseases of the respiratory organs and of the circulatory system. Within its sphere it contains useful information. Medical students will find it a desirable companion when preparing for their oral examination. The publishers are to be congratulated on its production.

P D.

MATERIA MEDICA, PHARMACY, PHARMACOLOGY AND THERAPEUTICS.—By W. Hale-White, K.B.E., M.B. (Lond.), M.D. (Dub.), LL.D. (Edin.). Twenty-second Edition revised by A. H. Douthwaite, M.D., F.R.C.P. 1935. J. and A. Churchill, Limited, London. Pp. xi plus 552. Price, 10s. 6d.

The twenty-second edition of this book scarcely needs an introduction, for in the forty-four years since the appearance of the first edition it has become known and used by successive generations of medical students until it is probably now the most widely-known book on the subject in the English language.

This edition has been produced to keep the book abreast of advances in therapeutics especially in the sections on vitamins and biological products and to bring it into line with the new edition of the *British Pharmacopœia Codex* which was issued last year. The work has been well done by its present editor and this small volume in its rejuvenated state can be still relied on by students and practitioners to provide them with practically all they need to know on materia medica, pharmacy, pharmacology and therapeutics.

P A M

THE CLINICAL ASPECTS OF VISCERAL NEUROLOGY WITH SPECIAL REFERENCE TO THE SURGERY OF THE SYMPATHETIC NERVOUS SYSTEM.—By W. K. Livingstone, M.D. 1935. Baillière, Tindall and Cox, London. Pp. xi plus 254, with 46 figures. Price, 22s. 6d.

The last decade has seen an ever-increasing interest in the physiology and pathology of the autonomic nervous system. As yet most of the important work done is scattered in numerous papers in diverse journals and anyone who is interested has to undertake a laborious quest before he can master even the essentials of the subject. For this reason a monograph dealing with the fundamentals of the normal and abnormal functions of the autonomic nervous system is very welcome. The present work is all the more so, for it treats the problems primarily from a clinical standpoint. The book opens with a brief but most accurate and up-to-date account of the anatomy and physiology. After that each pathological condition is illustrated by clinical notes of several actual cases. This method leaves unforgettable mental pictures while at the same time it serves to bring out the variations as well as the difficulties associated with diagnosis. The views expressed are very balanced; advances are recorded while at every stage the limitations of our knowledge are emphasized. Very

valuable are the beautiful coloured plates and charts interspersed throughout the book. The various surgical procedures are all grouped in the closing chapters. One gathers the impression that the author must have been pressed for space, for many important details of technique as well as the difficulties and dangers of the operations described are omitted. Perhaps in a book intended for the average practitioner this is not a serious drawback. It is a book to be read by every practitioner and possessed by every consultant, medical and surgical.

K V K.

BACKACHE.—By J. Monnell, M.A., M.D., B.C. (Cantab.). Illustrated by Margaret Morris. Second Edition. 1935. J. and A. Churchill, Limited, London. Pp. x plus 227. Illustrated. Price, 10s. 6d.

The author has given a comprehensive account of the symptoms, diagnosis, treatment and prophylaxis of backache from the standpoint of an orthopedic physician.

The volume is a record of his own work and contains no quotations from other works or from articles already published on the subject. The author first points out the importance of taking a careful and complete history of every case. Then he insists on the search for a septic focus. Next he describes the various methods of examination of different parts, which are illustrated with line-drawings. He has also shown how to tabulate the findings of the examination so that they can be reviewed at once. Two chapters have been devoted to diagnosis and differential diagnosis of the various conditions giving rise to backache. In the section on treatment methods of movement, manipulation, massage and electricity have been described.

The book is well indexed and well produced and should prove very helpful especially in orthopedic practice.

R. N. C.

THE DIABETIC A. B. C.—By R. D. Lawrence, M.A., M.D., F.R.C.P. (Lond.). Third Edition. 1935. H. K. Lewis and Company, Limited, London. Pp. vii plus 59. Price, 3s. 6d.

This little book is intended to be used as a practical guide by patients especially to enable them to follow the author's *line ration scheme* of dieting intelligently. The present edition contains, like its predecessors, useful information of a somewhat broad and general nature and as such is likely to be of value to diabetic patients undergoing treatment.

No fundamental changes have been introduced in the present edition except that the *line ration scheme* has been somewhat modified to provide lower fat and higher carbohydrate diets when desirable.

J. P B

TREATMENT BY DIET.—By C. J. Barborka, B.S., M.S., M.D., D.Sc., F.A.C.P. 1934. J. B. Lippincott Company, Philadelphia and London. Pp. xii plus 615. Illustrated. Price, 21s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 15-12.

This is an eminently practical book; only the minimum of space compatible with giving necessary information is devoted to descriptive passages, and a larger part of the book is composed of diets arranged in lists so that one can at a glance pick out the foods recommended.

Part I is a short account of the dietetic principles to be followed in normal health which might be profitably read by both the medical profession and the lay public for it is couched in such simple language that anyone could understand it.

This is followed by a part devoted to diet under special diseases in section A is given the diseases in which diet is an essential part of treatment, and section B in which attention to diet is less important

though still worthy of consideration. A short section is devoted to dietetic suggestions for an ordinary hospital and there is a section devoted to tables giving food values, normal weights, etc., and a few selected recipes. There is a copious bibliography so that the reader is given ample assistance in acquiring further information should he feel he needs it.

This is a book which will be of great use in enabling a busy practitioner to rapidly select a suitable diet for any case and it is one that might be handed to an intelligent patient with advantage.

P. A. M.

CLINICAL PATHOLOGY AND THE TECHNIQUE OF COLLECTING SPECIMENS.—By W. Smith, M.A., M.D., B.Chlr. (Cantab.). 1935. J. and A. Churchill, Limited, London. Pp. x plus 227. Illustrated. Price, 10s. 6d.

THIS small book is somewhat disappointing for in the preface the author states that '... an attempt to describe some of the elementary principles of clinical pathology... including the apparatus required for collecting various specimens...' is made. Perusal of the book leads one to the conclusion that the attempt has not been particularly successful. So much space is devoted to descriptive passages that are so elementary and brief as to be of little use, that very little room is left for the practical information the book sets out to convey. It is not a book we can recommend.

BACTERIOLOGY AND PROTOZOOLOGY: IN MEDICINE AND PUBLIC HEALTH. (Catechism Series.)—By W. R. Logan, M.D., F.R.C.P.E., D.P.H. Fourth Edition. Part II. E. and S. Livingstone, Edinburgh. Pp. from 77 to 156. Price, 1s. 6d. Postage, 2d.

A CONSIDERABLE amount of ingenuity is required in a book of this type, where the main points in the study of the various micro-organisms and protozoa of interest to the medical profession are brought out in the form of question and answer, to give adequate information without being dogmatic and without entering into long discussions. That this has been achieved is evident from the popularity of the book which is now in its fourth edition.

It will prove of particular value to students appearing for an examination. Its chief danger, as in all books of this type, is that it is apt to encourage the pernicious habit of cramming.

J. deM.

HANDBOOK OF ANÆSTHETICS.—By J. S. Ross, M.B., Ch.B., F.R.C.S.E., and H. P. Fairlie, M.D. Fourth Edition. 1935. E. and S. Livingstone, Edinburgh. Pp. xv plus 299. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 7-14

THIS small book is written in a delightfully clear manner quite free from ambiguity. The essentials of the physiological aspect of anæsthetics in general are adequately discussed in the opening chapters. The next chapter is devoted to particularly clear instructions on the administration of anæsthetics and the care of the patient during the course of anæsthesia. The various anæsthetics are next dealt with in detail, their special physiological action being fully explained, and all the most modern methods and apparatus described.

Then there are three chapters on accidents and sequelæ of anæsthesia, and the posture of the patient, another short chapter on anæsthesia in labour and one on the choice of an anæsthetic. All the chapters are short but contain ample information. In the reviewer's opinion this brevity combined with remarkably clear style of expression is the great advantage of the book, for at the end of each chapter he felt he had absorbed its contents with no more effort than is required by careful reading.

At the end of the book are two chapters, one on local and the other on spinal anæsthesia.

It is a book that can be strongly recommended to the student for if he reads and absorbs the teaching it contains he will be competent to administer anæsthetics with very little extra instruction in the practical use of the various forms of apparatus.

THE TREATMENT OF FRACTURES.—By Dr. L. Böhler. Fourth English Edition. Translated from the Fourth Enlarged and Revised German Edition. By E. W. H. Groves, M.S., M.D., F.R.C.S. 1935. John Wright and Sons, Limited, Bristol. Pp. x plus 578 with 1,059 illustrations. Price, 42s.

ONCE again surgeons throughout the English-speaking countries must express their grateful thanks to Professor Hey Groves for his clear and excellent translation of Dr. Lorenz Böhler's book *The Treatment of Fractures*.

This work, which is a description of the methods dealing with the treatment of fractures in the Hospital for Accidents in Vienna, has already to a great extent been described in the previous three editions.

Dr. Böhler's earlier work was confined chiefly to the treatment of fractures of the limbs, but as his practice and fame increased, he was able to enlarge his hospital, and he now deals most skilfully in his clinic with every type of fracture and dislocation. His methods are widely known and highly commended by all surgeons, and his book has definitely taken its place as a classic in the treatment of fractures.

The fourth edition has increased in size, the chief additions being much longer chapters on the treatment of fractures of the spine, and of the os calcis. Fractures of the upper end of the femur also come in for special mention, and all the well-known methods of fixation are clearly described. Of the operative methods the author appears to favour that of the Smith-Petersen three flange pin.

Dr. Böhler is insistent that, in order to obtain the best results, perfect team work is essential, and x-rays must be unstintingly employed. He never uses general anæsthesia in reducing a fracture, local administration of novocaine, and occasionally regional anæsthesia being quite sufficient.

He does not believe in massage over the site of fracture but is enthusiastic in its use in neighbouring joints combined with movements.

He is scathing in his remarks about some practitioners who determine blood coagulability and basal metabolism, but allow joints to become stiff.

Dr. Böhler's own experience in treating fractures of the carpal scaphoid is interesting. He used to immobilize the wrist in plaster for four weeks, but results were not satisfactory. He now never takes off the plaster for at least six weeks when treating this condition as he has found that bony union is never complete before this date.

Not the least interesting parts of this book are the appendices, especially appendix D, which deals with fractures in relation to environment.

The book is a great achievement, and an excellent production. It should be added to the library of every hospital and surgeon.

H. E. M.

HEALTHY WEDDED LIFE: A MEDICAL GUIDE FOR WIVES.—By G. T. Wrench, M.D., B.S. (Lond.). Fourth Edition. 1935. J. and A. Churchill, Limited, London. Pp. ix plus 339. Price, 6s.

THIS book is written in simple language for the lay public and will probably be found of use by a certain number of people. At the same time it should be noted that a great deal of the subject-matter is only a discussion of ordinary common-sense principles of health which a large proportion of the public are quite capable of adopting without having to learn about them in a book.

The author is rather inclined to wander from his subject and long passages are devoted to discussions on exercise, food and the use of alcohol for example which have no special bearing on wedded life as distinct from the ordinary healthy life of an individual be he (or she) married or single.

It is a book that might be read with profit by the unthinking and ignorant, but we do not consider the person of average intelligence will learn much from its pages.

A TEXTBOOK OF BIOCHEMISTRY.—Edited by B. Harrow, Ph.D., and C. P. Shorwin, M.D., Sc.D., Dr.P.H., LL.D. 1935. W. B. Saunders Company, Philadelphia and London. Pp. 797. Illustrated. Price, 25s.

This new textbook is the outcome of the immense strides made in the subject of biochemistry in the last few years. No one at the present time is capable of writing intimately on all branches of the subject. The book containing thirty different chapters includes twenty odd different contributors each one a master in his own field. The field covered is extremely comprehensive and includes new developments which have only recently acquired an independent existence. The chapter on oxidation and reduction and the measurement of their potential is one which is undoubtedly going to be of considerable importance in the future since many or most biochemical phenomena consist essentially in this change.

The chapter on the biochemistry of bacteria, yeasts and moulds is interestingly written and is nowadays of considerable commercial importance apart from its scientific interest. The chapter on immuno-chemistry is well written by an authority on the subject and marks the co-operation of the biochemist and bacteriologist in the investigation of disease. An enumeration of all the chapters is impossible and it is unlikely that the whole book could be read critically by any one man. It should appeal to the biochemist, the biophysicist and the intelligent medical man with a bias in this direction although it should be pointed out that the latter will have to use his imagination and ingenuity as the book has not in general a medical trend. A good and not too large list of references is given at the end of each chapter. The writers have written their survey essentially to the point and made a critical and relevant selection of their material.

H. E. C. W.

OPHTHALMOLOGY IN GENERAL PRACTICE.—By O. G. Morgan. 1935. John Bale, Sons and Danielsson, Limited, London. Pp. 58. Illustrated. Price, 2s. 6d.

This little book of 58 pages is one of a series of 'Pocket Monographs on Practical Medicine'. It is written for the general practitioner in the hope of helping him to deal with the ocular conditions which he is liable to come across in private practice and those in which early and accurate diagnosis is of paramount importance to the eye.

With this end in view, the author points out the importance of a careful routine examination of the eyes and rightly lays stress that the focusing lens, the loupe and the binocular magnifier are of more value than the ophthalmoscope, as the great majority of the eye conditions for which the patients come for advice are in the front part of the eye, i.e., the lids, conjunctiva, cornea, iris and ciliary body. Short and very practical descriptions are given of the diseases affecting these parts of the eye-ball and their differential diagnosis.

The common diseases of the fundus that the practitioner is likely to come across in his daily routine are briefly described and can nowadays be so easily diagnosed by the electric ophthalmoscope if the practitioner will only take the trouble to use and master it.

The book is interesting but will hardly be sufficient for the general practitioner in India, a country in which

eye diseases are so common and comprise a large part of the cases that seek his advice.

E. O'G. K.

AIDS TO OPHTHALMOLOGY.—By N. Bishop Harman, M.A., M.B. (Cantab.), F.R.C.S. (Eng.), Hon. LL.D. (Man.). Eighth Edition. 1935. Baillière, Tindall and Cox, London. Pp. viii plus 242, with 124 illustrations. Price, 3s. 6d.

This excellent little book in 'The Students' Aid Series' has reached the eighth edition, the first having been written as far back as 1908. It comprises forty chapters condensed in a remarkably concise form and is mainly intended for the use of students before graduation.

The present edition has undergone a thorough revision to bring it up to date and much new matter has been added without adding appreciably to its size. A chapter on 'Standards of vision' has been included which will be found most useful in the examination of candidates for official and other appointments.

The author has very wisely not attempted to describe any of the rarer eye diseases. The book is written in a simple style, is well illustrated and eminently practical. It will be found most valuable not only to the student but to the general practitioner.

E. O'G. K.

ANATOMY. (THE THORAX.)—By C. R. Whittaker, F.R.C.S.E., F.R.S.E. Fourth Edition. Part V. (Catechism Series.) E. and S. Livingstone, Edinburgh. Pp. 59. Price, 1s. 6d. Postage, 2d.

This book of the catechism series deals with the thorax in the form of questions and answers. The mediastinum with its subdivisions has been carefully described and the contents of each subdivision have been clearly enumerated in a tabulated form. The heart has been fully dealt with in consideration of the importance of the organ, and its topography clearly indicated. The relations of the main organs and blood vessels have been put in a tabulated form. The new nomenclature has been chiefly adopted throughout. This small book will be extremely useful to students for quick revision of the subject during examination.

N. P.

OTHER BOOKS RECEIVED

The Madras Medical Directory. Second Edition. 1936. Published by T. S. Lakshminpathy, Madras. Pp. 281. Price, Rs. 2-8.

Abstracts from Reports

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF BIHAR AND ORISSA FOR THE YEAR 1933. BY MAJOR S. L. MITRA, D.P.H., I.M.S., OFFG. DIRECTOR OF PUBLIC HEALTH, BIHAR AND ORISSA

Cholera statistics.—The death rate from cholera rose from 0.2 per mille in 1932 to 0.5 per mille in 1933. The districts of Cuttack and Balasore again reported the highest death rate from cholera, viz. 3.8 and 1.5, respectively. Amongst the towns Kendrapara (3.7), Jajpur (3.4) and Colgong (2.8) reported highest death rates.

Cholera in the province.—The total number of deaths from cholera in 1933 was 17,514 as compared with 9,348 in 1932. The districts in South Bihar and Chota Nagpur were comparatively free from cholera but the districts of North Bihar, specially Darbhanga, Champaran and Muzaffarpur had a mild epidemic of cholera at the close of the monsoon. The disease started early in an epidemic form in the district of Cuttack and Balasore and it was prevalent more or less

throughout the year. The civil surgeon of Cuttack with the help of the local bodies took prompt measures to control the epidemic. Twenty thousand people were inoculated against cholera and excellent results were obtained from the use of cholera phage in certain areas of the district. The epidemic of cholera in the district of Balasore, which caused 1,442 deaths, remained a special source of anxiety to the department for most of the year. Extra grants had to be made to the district board of Balasore for the appointment of epidemic doctors over and above the services of two doctors lent from the Government public health cadre. At Puri both the Snan and Rathjatra festivals passed off fairly successfully and the sanitary measures taken in the town under the supervision of the health officer proved quite satisfactory. No epidemic in the district followed the *mela*.

Cholera preventive measures.—With the growth of public health organizations in districts there is rapidly being created, in those districts which employ health officers, an efficient and well-trained staff to deal with outbreaks as soon as they occur. Twelve district boards now maintain health officers with a suitable subordinate health staff. There are fewer demands for extra epidemic doctors to combat cholera in these districts. But when the outbreak becomes serious and widespread and the district staff are unable to cope with the situation, officers are detailed from this department. Besides, temporary doctors are also employed by the Government to assist the local bodies in times of stress. Demands for epidemic doctors are usually numerous from the districts which have no permanent health organizations.

Stocks of disinfectants such as bleaching powder and permanganate of potash and also kaolin for use for the treatment of cholera cases are kept in reserve by the district boards. If required the civil surgeons requisition for these disinfectants and drugs from the Director of Public Health; the local bodies also get supplies of disinfectants from Government in cases of emergency. Government also maintain a large stock of cholera vaccine at the vaccine depot, Namkum. The superintendent, vaccine depot, is generally asked by telegram to despatch vaccine immediately wherever it is required. The number of doses of cholera vaccine issued has steadily increased and from 1923, 240,000, 656,300, 731,000, 666,510, 241,235 and 458,822 doses were supplied each year up till 1933. This preventive measure is getting more and more appreciated and now hardly any objection is raised to its use even in the remote villages. There are now indications to show that people of their own accord offer themselves for inoculations at the approach of the cholera season. Prophylactic inoculations against cholera are extensively carried out at all the important *melas* and this measure apparently proved effective in preventing the outbreak of a cholera epidemic after the Rathjatra festival.

Bacteriophage experiments.—In view of the encouraging results obtained with cholera phage in the two previous years in Purnea and Muzaffarpur districts of North Bihar, it was decided to continue the experiments in those two districts and to extend them to include the districts of Patna and Gaya in 1933. The arrangements of the last two years were accordingly repeated in these four districts, through the district boards concerned. Cholera phage was also used in dealing with the outbreaks of cholera in the districts of Puri, Cuttack and Bhagalpur.

Bihar witnessed another comparatively mild cholera year in 1933. The earlier months of the usual cholera season were comparatively free from epidemics. The intensity of the outbreaks was felt from the middle of July. Even after July the areas south of the Ganges escaped with fewer outbreaks. In the Northern district, the outbreaks were rather widespread except in Saran. Of the other five districts, the districts of Muzaffarpur and Purnea, where bacteriophage was

used, recorded comparatively few deaths, as will appear from the following table.

The following figures are from 1st January to 31st December, 1933, as furnished by the health officers:—

	Attacks	Deaths
Saran	306	127
Champan	810	518
Muzaffarpur ..	931	306
Darbhanga ..	2,042	1,097
Purnea	665	289
Bhagalpur	1,704	1,463

Purnea.—In Purnea district, out of a total of 665 cases, 289 deaths were recorded. Of 665 cases 333 were not treated with phage. Of these 333 cases, 214 died. Therefore the mortality among the cases who did not get cholera phage was 64.2 per cent. Of the remaining 332 cases who were treated with cholera phage, only 75 deaths were recorded, a mortality of 22.5 per cent. The average time taken to stop an outbreak completely after the use of phage was 3.26 days.

Muzaffarpur.—In the Muzaffarpur district out of a total of 931 cases, 306 died. Five hundred and eighty cases treated with phage had 79 deaths, a mortality of 13.6 per cent. The remaining 350 who had either no treatment or had been treated by doctors and *vaid*s recorded 263 deaths or 75.1 per cent.

It is significant that better results were obtained in Muzaffarpur district where a larger proportion of cases had received the phage treatment. Sixty-seven per cent of the outbreaks in Muzaffarpur district were completely stopped within two days and 77 per cent within five days of the use of phage. Only 11 per cent continued for more than five days. These long duration outbreaks were almost entirely confined to the out-of-the-way areas.

Patna.—In the Patna district there were fewer outbreaks of cholera. Of those treated with phage, 17 or 31.5 per cent died, and of the remaining cases treated otherwise in the villages, 39 or 53 per cent died. The duration of the outbreaks was two days in 76 per cent and five days in 92.3 per cent of the total outbreaks. Only in 7.6 per cent of the outbreaks did cases appear after seven days of application of cholera phage. The longest duration was 13 days in one scattered village, situated in an island of the Ganges.

Gaya.—In the Gaya district very few outbreaks were recorded. The progress of one outbreak was closely scrutinized by the Assistant Director of Public Health, South Bihar Circle. One night a cholera case arrived at Nawada railway station from Calcutta. He was offered phage, but the relatives refused it and took him to their village home at Gajra a few miles from Nawada and placed him under a doctor. He died the next day. Two cases soon appeared in the locality and were cured under bacteriophage treatment. The population was given phage. No further case was reported from the village.

The results obtained so far indicate that besides being cheap and easy of administration bacteriophage is better for the prevention and treatment of cholera than the usual methods. The use of bacteriophage has accordingly been extended, as far as possible, throughout the province.

ANNUAL REPORT OF THE MYSORE STATE DEPARTMENT OF HEALTH FOR THE YEAR ENDED 31ST DECEMBER, 1933

GENERAL

The state of public health in Mysore State was on the whole satisfactory in the year under report. The incidence of smallpox showed a tendency to rise towards the end of the year but the carrying on of

intensive vaccination campaigns in view of the forecasted increased prevalence of the disease helped largely to keep the disease under control. Plague was similarly controlled by the timely adoption of anti-disease measures such as evacuation, inoculation and disinfection. In the latter half of the year, an increased prevalence of influenza was reported in Chitaldrug district. The reaping of a good harvest of agricultural crops and a phenomenal fall in the prices of food grains were reported. The recorded rainfall during the year was 48.46 inches, the rainfall being above the average in all the districts.

The activities of the department having spread largely during recent years due to progress made from time to time in the advancement of health plans and procedures, a handbook has been published for the information of those interested in the State's health problems.

The agreement with the Rockefeller Foundation in respect of financing the budget of the Bureau of Health Education for two years terminated on 31st December, 1933, and Government have taken over the budget of the Bureau from 1st January, 1934.

At the Annual Dasara Exhibition, a Health and Sanitation Stall was organized as in previous years in order to popularize the anti-disease measures adopted by the department in controlling diseases like plague, smallpox, cholera, malaria and so on.

A popular health journal in Kanarese and English has been a long-felt want and the first issue of 'The Mysore Arogya' for the quarter ended 31st December, 1933, has been well received. It is proposed to improve this in the coming months.

Dr. W. C. Sweet continued to act as consultant in health to the Government of Mysore.

The cities of Bangalore, Mysore and Kolar Gold Field have had full-time health officers. So far as the districts are concerned, only Mysore and Shimoga districts have full-time health officers, the other districts having district medical officers as *ex-officio* sanitary officers. It is to be hoped that each district will soon have a health officer. Health work in the districts can be effective only when the entire staff of vaccinators and sanitary inspectors is transferred to the health department.

A spleen survey of 60 taluk headquarter towns was completed in the latter part of the year. Their rates were used to test the efficacy of a formula which has been worked out for the forecasting of malaria epidemics.

In order to devise measures for the control of malaria in the Anjanapur irrigated tract in the Shimoga district, a committee was constituted by Government. Anti-malaria work in the cities of Bangalore and Mysore was continued during the year and considerable reduction in the spleen rates in children under ten years of age has been observed. The reduction of spleen rates in Bangalore city from 23.2 in 1927 to 1.2 in 1933 indicates the value of the anti-malaria operations carried on in the preceding years.

Malaria relief work was started in the Irwin canal zone and was continued throughout the year.

The hookworm campaign was temporarily suspended during the year.

The control of guinea-worm disease in Chitaldrug district has been engaging the attention of the department and preliminary investigations in the biological control of the disease are being made.

Two sanitary inspectors trained in malaria work in the State were lent for about six weeks to the Director of Public Health, Bombay Presidency, to assist in the malaria survey work of the Poona suburban area.

Lanoline lymph enough for 585,810 cases was prepared at the vaccine institute, of which lymph enough for 302,942 cases was issued to stations inside the State and lymph enough for 3,655 cases to stations outside the State.

The public health institute examined 9,107 specimens in the bacteriological section and 705 in the chemical section and 707 articles in the medico-legal section.

One hundred and two cinema shows were given during the year in 45 different places to an audience of about a hundred thousand persons. The shows have become popular and requests for these are too many to be complied with, with the existing staff and a single motor van. There is therefore an urgent need for at least one additional unit with a few more films, if this type of propaganda work has to reach a larger rural population.

At the end of the year 1932, the number of piped water-supplies in the State were 30, serving a population of 691,991. Four existing water-supplies were improved during the year and their capacities enlarged, and the six new works installed serve an additional population of about twelve thousand.

Municipalities and village panchayats evince keen interest in the construction of bore-hole latrines and as many as 218 latrines were completed during the year.

The composting of night-soil in Mysore city is being continued.

An important feature of the rural health work in Mandya in the year under report was the control of plague and smallpox. A total of 5,208 anti-plague inoculations and 5,565 vaccinations was done.

The number of births reported in Mysore State was 117,920 during the year as compared with 115,627 in the previous year, and the computed birth rate was 17.99 as against 17.79 in the preceding year. The rates varied from 21.44 in Kolar district to 14.15 in Hassan district.

The number of deaths reported during the year was 106,009 as compared with 88,175 in the previous year and the computed death rate was 16.17 against 13.57 in the preceding year. The increase in the number of deaths was due to the reported increase of mortality under fevers. Some of the excess was also due to excess of mortality under dysentery and diarrhoea. The death rates varied from 26.66 in Chitaldrug district to 13.60 in Bangalore district.

The number of deaths recorded of infants under one year of age was 11,733 as compared with 11,026 in the previous year, and the computed infant mortality rate was 99.50 against 95.36 in the preceding year. The rates varied from 138.13 in Shimoga district to 58.28 in Mysore district.

The major health problems in Mysore State are the effective control of endemic diseases like malaria, plague and smallpox. Cholera, on the other hand, is not endemic in the State and assumes epidemic proportions once every four to six years.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1933. BY LIEUTENANT-COLONEL T. D. MURISON, D.P.H., I.M.S., DIRECTOR OF PUBLIC HEALTH, ASSAM

THE state of public health in the province during the year under review was not very satisfactory. Deaths under all heads of mortality, with the exception of smallpox, were larger during the year 1933. There was a severe cholera epidemic in the Surma Valley districts during the year. The largest increase in the number of deaths was from 'fevers' and this was followed by the increase under 'all other causes'.

A total of 161,054 deaths was recorded during the year, of which 5,508 were from cholera, 247 from smallpox, 103,890 from fever, 9,267 from dysentery and diarrhoea, 5,444 from respiratory diseases, 2,102 from injuries and 34,596 from 'all other causes'.

The total number of deaths from cholera reported during the year was 5,508, as compared with 4,971 in

is of great help in keeping down hookworm infection in the population and lessening the chances of its spread. In the present state of gross soil pollution in villages an untreated case of hookworm is a fruitful source for the dissemination of the infection in the community. During the year 218,143 treatments were given of which 10,722 treatments were given by the rural sanitation staff, 143,278 by the various medical institutions and the rest by other agencies.

Provision of latrines.—The bore-hole latrine is cheap and efficient and requires only minimum attention to keep it clean. The trench latrine is a modification of this for use as a public latrine in places where latrines are heavily used. The greater part of the time of the field staff was occupied in popularizing these latrines and in constructing them for local bodies and others. The designs for enclosures have to be modified in several instances to suit local conditions. During the year under report 1,572 latrine seats were constructed and 1,164 seats were either reconstructed or repaired. The extent of this work has been largest in Madura district where considerable sums of money have been spent during the last few years on this branch of work.

Public latrines alone cannot solve the problem of soil pollution. The section is now turning its attention to the task of bringing about the provision of a bore-hole latrine for each house. To encourage the construction of bore-hole latrines for private houses, the Madura district board has a scheme of giving squatting slabs at concession rates to individual house-owners. In other places, the district health officer's propaganda has been so successful that private contractors have undertaken as a commercial proposition to provide individuals with bore-hole latrines in their houses at an inclusive rate. This kind of enterprise should be encouraged.

The success of this campaign cannot be judged merely by the amount of the allotment or by the number of latrines put up by the unit, although these are of great importance. The real test of the success of the campaign must be judged by the readiness of the local authority to carry on this work after the unit has been withdrawn. This will be proof that the seed sown has germinated and is bearing fruit. This aspect of the campaign is being pressed on the section and the units so that they may so carry on the propaganda to ensure this desirable result.

Malaria

The scheme of free distribution of quinine which constitutes the main item of the campaign against malaria is financed entirely by the Government and functions in 13 out of the 26 districts of the province. Although a grant of Rs. 45,000 was made, equal in value to about 2,500 pounds of quinine, on account of the surplus stock available at the beginning of the year only Rs. 25,000 was utilized, equal in value to about 1,300 pounds of quinine. About a million and a half people came under the working of the scheme and of them 160,539 persons were treated during the year. Quinine is apparently becoming more and more popular with these people. This is due to increasing propaganda on the part of the district health staff and the slowly growing recognition on the part of the people in the malarious district of its usefulness in cutting short the course of the attack and minimizing the mortality due to the disease. In the three districts where the bulk of the quinine is distributed, the total death rate and the fever death rate have been showing a steady decline since the introduction of the scheme in 1928 up to 1932. There has been, however, an increase during the year under report which is probably due to local fluctuations and other extraneous causes.

As neither the local bodies nor the Government have the necessary finances to institute permanent anti-malarial campaigns in the endemic areas in the province, malarial surveys were carried out only in such areas where there was a reasonable prospect of

the actual work being undertaken as a result of the surveys.

Restricted anti-malarial measures, viz, treating with Paris green the breeding grounds in six villages, viz, Krishnadevipet, Chintapalli, Padwa, Pottanghi, Koraput and Jeypore, in the Vizagapatam Agency Tracts were continued during the year under the supervision of the agency surgeon, Koraput. The striking results at Krishnadevipet judged both by spleen rates and hospital figures recorded in the previous year show an even further improvement during the year under report. The spleen rate which varied from 10 per cent to 70 per cent in 1929 before the scheme was started now ranges from 6 per cent to 25 per cent in the seven villages on the banks of the Nagapuram and Krishnadevipet rivers which are the streams systematically treated with Paris green. The total annual cost for this campaign in this group of villages comes to about Rs. 2,500 for a population of over 7,500 and hence works out only at the rate of Re. 0-5-4 per head per annum.

Maternity and child welfare

In spite of unexpected set-backs there has been steady progress in this comparatively new branch of preventive medicine since the formation in 1931 of a separate section for maternity and child welfare in the Department of Public Health and the appointment of an Assistant Directress of Public Health (Maternity and Child Welfare). This progress is in a great measure due to the support of the Government who have in several Government orders stressed the importance of maternity and child welfare work, and have urged local bodies to institute and carry on suitable schemes with the advice and under the guidance of the Director of Public Health. Accordingly one of the first steps taken was to organize maternity and child welfare schemes on correct lines under their own administrative control.

Provision is being made in an increasing measure for ante-natal work. Home visiting, instruction to mothers and the supervision of the welfare of infants and children have been made regular features of the schemes. The work of the midwives and health visitors has been brought under systematic supervision.

Medical inspection of schools

The scheme for the medical inspection of schools has been held in abeyance owing to financial stringency.

Health propaganda

During the year under report new material was prepared and a revision of some of the old material was undertaken. The cinema now occupies an important place in health education and several portable cinema sets are now available with the health staff in the districts. Two cinema films were produced by the department during the year. One of them with the title 'Never say die' deals with leprosy. It is a four-reel film and has a good story which is much appreciated by the public. The other 'Better late than never' is on tuberculosis. The production of this four-reel film was financed by the Health Propaganda Board, Madras. There is a large demand from the districts for the supply of suitable films. Films depicting local conditions are of immense use for propaganda work.

A new set of coloured magic lantern slides on leprosy was also prepared during the year. The usual projection lantern worked with acetylene gas was found to be not only cumbersome for use by the health inspectors, but, owing to the constant care necessary to keep the gas generator and jets in good working order, it was also often neglected. An experiment was therefore made to alter this lantern in such a way that it could be worked with a baby petromax light. The experiment was a success and five lanterns were so altered for use by the health staff in the rural development area, Tiruvallur.

A pamphlet on food and popular dietaries was issued this year.

Eight lithographic coloured posters, seven on tuberculosis and one on cholera, were prepared and issued during the year.

Vaccination

There has again been a fall under primary and secondary vaccinations while the number of re-vaccinations has increased to a very considerable extent. The fall under primary and secondary vaccinations has been explained as due to the thoroughness of primary vaccination in previous years in some districts, whereas in a majority of districts it has been attributed to the widespread epidemic of smallpox which necessitated the vaccination staff devoting most of their time to re-vaccinations in and around infected areas and their consequent inability to visit the uninfected villages during the year for routine primary vaccination.

Industrial hygiene

A larger number of factories and cottage industries is springing up both in town and rural areas. Many local bodies have foreseen these developments and have made provision for them, but many more have failed to act and to set apart industrial areas. Consequently many mills have been built in unsuitable sites without consulting either the local health officer or the inspector of factories. In many of these places vested interests have exercised an undue influence over the local authorities and the collector and Government have had to take suitable action. The use of electric power for driving factories has introduced a new factor which will become increasingly important. Conditions which under the use of steam or oil rendered the proximity of a factory or mill obnoxious will under the new conditions not assume such importance and the question of locating factories under these conditions will be beset with new difficulties and a new outlook will be rendered necessary.

The recommendation of the Royal Commission on Labour for the appointment of an assistant director of public health for investigation of questions of industrial hygiene is under consideration of Government.

Correspondence

'DRUG ADDICTION IN INDIA AND ITS TREATMENT'

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—With reference to the article by Colonel Chopra in your March number on 'Drug addiction in India and its treatment', the value of lecithin in the treatment of opium addicts does not appear to have been assessed at its proper value. When attending the Ninth Congress of the Far Eastern Association of Tropical Medicine and Hygiene at Nanking, one of the things which struck me most was the great advance which had been made in the treatment of opium addicts. In China this is an urgent economic problem, and as far as one could gather from the authorities, they think that a very practical method of treatment has at last been arrived at. The work done in the Antiopium Municipal Hospital, Nanking, seems to show that, in the average case, soya-bean lecithin, when administered in daily doses of 60 to 90 grains, produces spontaneous gradual discontinuity in the use of opium by the addict. The use of lecithin may be discontinued a few days after a complete stoppage of opium. The addict is not subjected to any discomfort. He is allowed his usual opium either for smoking or eating and a comfortable spontaneous recovery takes place within a few weeks. It is not for me to give the details here as this has

been done by the originator of the method. This work has been carried out under the Chinese National Opium Suppression Commission and all information may be obtained either from the research workers themselves or from Dr. J. Heng Liu, Chairman of that Commission and President of the Ninth Congress. This successful campaign against the opium habit struck me so forcibly that on my return from China I suggested to the Surgeon-General with the Government of Madras that all medical officers under his control should be circularized officially with regard to this method of dealing with opium addicts in the same way that they are familiarized with other important curative and preventive methods. It is interesting to note that China has turned one of her great agricultural products, namely, the soya bean, to good account in counteracting the evil effects of another of her great agricultural products. The practical work of the Antiopium Hospital is founded on the experimental research of Dr. Wen-Chao Ma.

Yours, etc.,

R. E. WRIGHT, C.I.E.,
LIEUTENANT-COLONEL, I.M.S.

MADRAS.

13th June, 1935.

A PLEA FOR THE USE OF CONCENTRATED SALINE IN CHOLERA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR.—With reference to a letter published in the May issue of the *Indian Medical Gazette* on the subject of treatment of cholera by concentrated saline by Dr. Narayana Rao of King Institute, Guindy, I would like to say that the treatment suggested does not satisfy the main principles on which the efficient treatment of cholera is based, viz:—

(i) That the loss of fluid from the system should be replaced as early as possible.

(ii) That the toxins which are produced by the cholera vibrio and which are being absorbed from the intestinal tract should be destroyed. Fluid is necessary in this connection for dilution and elimination of these toxins.

(iii) That the acidosis and suppression of urine should be combated. Alkaline treatment is essential in this connection but the replacement of fluid is also very important as the latter raises the low blood pressure and helps in the re-establishment of urinary flow.

Experience at this institution teaches that the prognosis in cholera cases depends on the following main factors:—

(1) Above all early, timely and efficient treatment.

(2) Saline hypertonic injections. The quantity administered should be controlled by specific gravity of blood, blood pressure and rectal temperature readings. If this is done, the danger of complications such as œdema of lungs, severe reaction, and copious evacuations is minimized.

(3) Alkaline treatment to combat acidosis controlled by examination of urine.

This is the main line of treatment followed in this institution. During the recent epidemic season (1st March, 1935, to 29th May, 1935) 872 cases of cholera were admitted in this institution. Of these 169 died giving a mortality rate of 19.4 per cent.

This figure, considering the bad type of hospital case obtained in this institution, and the fact that the figures refer to the epidemic period, when mortality is always higher than in the rest of the year, is quite encouraging.

I am definitely of opinion that in the treatment of cholera, the administration of fluid plays almost as important a rôle as that of salts and alkalies and I regret I am unable to agree to the suggestion made

by Dr. Rao that salt may be the chief factor in reviving the circulation.

Yours, etc.,
N. C. KAPUR,
LIEUTENANT-COLONEL, I.M.S.
Superintendent.

CAMPBELL HOSPITAL,
CALCUTTA,
7th June, 1935.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL J. M. R. HENNESSY, Civil Surgeon, was appointed to officiate as Inspector-General, Civil Hospitals, Central Provinces, with effect from the afternoon of 7th May, 1935, *vice* Colonel N. M. Wilson, granted leave.

Lieutenant-Colonel B. Z. Shah, Superintendent, of Mahabaleshwar, is appointed to be on general duty at the Sassoon Hospital, Poona, in addition to his own duties, on the close of the Mahabaleshwar season, pending further orders.

Major R. S. Aspinall, an Agency Surgeon, on reversion to the Foreign and Political Department, is posted as Civil Surgeon, Ajmer, and Chief Medical Officer, Rajputana, with effect from the afternoon of the 18th April, 1935.

Major R. C. Wats is appointed as Officiating Director, Haffkine Institute, Bombay, *vice* Lieutenant-Colonel S. S. Sokhey, pending further orders.

Major D. P. Bhargava is appointed to officiate as Chief Medical Officer and Civil Surgeon, Delhi, with effect from the date on which he assumed charge of the post, *vice* Lieutenant-Colonel Paton, granted leave.

The services of Captain C. A. Bozman are placed at the disposal of the Government of Burma, for employment in the Public Health Department, with effect from the 13th March, 1935.

Captain H. S. Smithwick, Officiating Civil Surgeon, Sholapur, is deputed to be temporarily in charge of the Main Hospital in the Haj Camp, Karachi, opened for the treatment of persons injured in the earthquake at Quetta, pending further orders.

Captain J. E. Gray, Civil Surgeon, Nasik, is appointed to officiate as Civil Surgeon, Karachi, *vice* Lieutenant-Colonel M. J. Holgate, proceeding on leave, pending further orders.

LEAVE

Colonel N. M. Wilson, O.B.E., Inspector-General of Civil Hospitals, Central Provinces, was granted leave on average pay outside India for 4 months, with effect from the afternoon of the 7th May, 1935.

Colonel C. A. Gill, K.H.S., Inspector-General of Civil Hospitals, Burma, was granted leave, with effect from the 31st March, 1935, to 11th August, 1935, preparatory to retirement.

Brevet-Colonel H. H. Thorburn, C.I.E., an Agency Surgeon, is granted leave for 12 months, with effect from the afternoon of the 18th April, 1935.

Lieutenant-Colonel W. C. Paton, M.C., Chief Medical Officer and Civil Surgeon, Delhi, is granted leave for 5 months, with effect from the 17th May, 1935.

Lieutenant-Colonel S. S. Sokhey, Director, Haffkine Institute, Bombay, is granted leave ex-India for 4 months, with effect from the 15th June, 1935, or subsequent date of availing.

PROMOTIONS

Lieutenant-Colonel to be Colonel

C. E. Palmer. Dated 15th February, 1935.

Majors to be Lieutenant-Colonels

C. J. L. Patch. Dated 20th May, 1935.

S. L. Mitra. Dated 20th May, 1935.

Notes

SANOCRYSIN AND OLEO-SANOCRYSIN

We have received a booklet from the manufacturer of the above gold preparations. It contains brief but adequate descriptions of the nature of these drugs, the indications for their use, the methods of administration and their dosage.

These are followed by reprints of papers by medical men in charge of tuberculosis hospitals and sanatoriums giving their experience and advice regarding the use of these drugs. It will be found a useful booklet for anyone who intends to use these preparations or for those who have already used them but have not yet accumulated much experience. Although it is published by the makers of these two preparations it can be scarcely classed as an advertisement for the booklet contains only statements of fact backed by observation of medical men, no extravagant claims for the efficacy of this form of treatment being advanced.

Medical practitioners can obtain copies of this brochure on application to Messrs. H. R. Napp, Limited, 3 and 4, Clements Inn, London, England.

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Original Articles

A PRELIMINARY REPORT ON AN EPIDEMIC DROPSY OUTBREAK IN PURULIA

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.)

LIEUTENANT-COLONEL, I.M.S.

Professor of Pharmacology

and

R. N. CHAUDHURI, M.B. (Cal.)

*Officiating Assistant Professor of Tropical Medicine
(From the School of Tropical Medicine, Calcutta)*

THE information collected by us indicates that the first outbreak of epidemic dropsy in Manbhum District occurred in 1913 and from this time up to 1926 no cases were reported. In 1927 a few cases were observed in the vicinity of Purulia but none in 1928 and 1929. In 1930 also there was a small outbreak in and around the town of Purulia and in 1932 and 1933 again some cases were reported with a few deaths. A widespread outbreak of an alarming character broke out in 1934 and started in the month of August in the town. The first reported death occurred in September in an affected family that came to Purulia for a change.

The intensity of the epidemic gradually increased and the disease spread into villages in the neighbourhood. It reached its height in November when it assumed a very widespread character. On information being received, one of us (R. N. Chaudhuri) was deputed to visit the place and report. Later, visits were paid by the senior author and Dr. Muir, and it was decided to send a small field unit to collect information.

Mr. Sen, the chairman of the Purulia Municipality, kindly made arrangements for us to take a census of the disease in the town by a house-to-house visit. This showed that over 2,000 individuals out of a population of 25,974 were affected during the current year. The deputy commissioner then started a survey of the whole district and, as far as our information goes, nearly all the villages towards the east and north of Purulia up to Raghunathpur police station and towards the west up to Joypur police station were found affected. An enquiry from 114 villages showed that about 5,000 individuals were suffering with the disease. The headmaster of the Manbhum Victoria Institution took a census and found that 35 per cent of the boys and staff of the school were suffering from it. The railway settlement at Purulia consisting of about 450 members was said to have 113 victims. The civil surgeon deputed a medical officer to tour the rural areas, and the information collected by him in 13 villages near Purulia is given below :—

Village incidence

Village	Population	No. affected	Village	Population	No. affected
Bhawanipur ..	700	85	Kodlah	300	50
Hutmena ..	600	50	Sodpur	100	25
Joynagar ..	200	40	Asjungorda	300	30
Lodurka ..	1,000	150	Chapba	500	10
Jojudi ..	250	40	Gangada	500	20
Chanchira ..	300	25	Charra	3,000	200
Ramdihi ..	300	100			

The mortality was heavy and some of these villages as well as Gorjoypur, Bhatbund, Kashi-pur, Gaurangdih, Talajora, Raghunathpur and Adra were visited by the field unit. A rapid survey was made and a large number of cases were seen in all the places except the last two where none could be found.

As on previous occasions in other places we found the disease was mostly prevalent among the upper and middle classes of the population. The disease was practically non-existent among the poor labouring classes, especially the Santals and Bauris. The few cases of the disease found among the latter class were in servants, who were having their meals at their masters' houses.

In order to study the family incidence we investigated twenty affected families in two villages.

There were 121 persons in these families and 74 were affected. The incidence of the disease in different families is given below :—

Family incidence

Serial number	No. in family	Number affected	Serial number	No. in family	Number affected
1	4	2	11	4	3
2	3	2	12	8	1
3	5	2	13	5	2
4	7	4	14	3	1
5	8	6	15	5	2
6	5	3	16	8	8
7	7	5	17	3	2
8	2	1	18	8	6
9	11	2	19	6	5
10	11	9	20	8	8

This table shows that twenty families consisting of 121 members had 74 victims during the time of our investigation. The severity of symptoms varied considerably in the members of the same family though the diet was the same.

Rice is the staple food of this district. In the case of the better classes, it is supplemented by vegetables, dāl, ghee, mustard oil and fish. In the case of the labouring classes the diet is mostly rice with salt and chillies, the other articles mentioned above being only used occasionally. Both classes use parboiled rice, which is as a rule husked at home. No milled rice is used by anyone, at least in the villages. Amongst the better class of people the rice necessary for the year's consumption is prepared from the paddy after the harvest and is stored in their houses, while the

labouring classes get payment in paddy from day to day and husk it into rice for immediate use. Another difference between the two classes is that while the better-off classes throw away the rice water, the poor labourers take it along with the rice. Further, the latter cook their food only once a day, at night; a part of it is kept overnight in cold water and is taken next morning and afternoon.

We collected samples of rice from different families in various localities. Many grains (50 to 80 per cent) in every sample even from unaffected houses showed central opacities. There was no notable difference in appearance between the old and new rice so far as opacity was concerned. Some samples of old rice were very friable and could be powdered with the fingers. We were told that a few years ago, when rice was sold very cheaply, rice merchants had purchased thousands of maunds of it and stored it in their godowns. Last year, owing to the scarcity of rain, the price went up and this rice was sold to the people. Samples of sun-dried or *atap* rice shown to us did not have such opacities and were not friable. Cultures were made from this diseased rice (opaque and friable) obtained from the affected houses. They were heavily infected with spore-bearing organisms of the 'vulgatus' group. Some strains of the organisms isolated agglutinated in quite high dilutions with sera of convalescent patients. This question is being studied in detail and the results will be published in due course.

We also collected samples of mustard oil from affected as well as unaffected houses as there is a strong belief among the local people that it is responsible for the disease; we had a few samples analysed. The specimens were mostly adulterated. Further investigations are being carried on to see if the oil contains any toxic substances.

In order further to study the epidemic in detail we decided to work in a small village by collecting data from the affected as well as unaffected families and to make clinical observations. We selected Gaurangdih, a village near Indrabil railway station, for this study. A field unit was stationed there to carry on epidemiological, clinical and bacteriological work along with relief work, and the results of this investigation will be published in detail later.

Clinical findings

Clinical examinations were carried out on a large number of the patients. In this paper we give the results of the analysis of the data of the first 66 patients. These patients were distributed among the following places—

Purulia—24, Bhatbund—10, Bhawanipur—9, Hutmura—10, Charra—13.

Sex. There were 35 male and 31 female patients. It is evident therefore that both the sexes are almost equally affected.

Age. There was no case under the age of four years.

Age incidence

Age group	Incidence	Age group	Incidence
4 to 10	17	41 to 50	6
11 „ 20	15	51 „ 60	2
21 „ 30	11	61 „ 70	1
31 „ 40	12	71 „ 80	2

In a previous paper Chopra and Basu (1930) showed that nearly all the patients in a series of 19 were under 30 years of age. This table shows that only 11 out of 66 patients were over 40 years, and that the disease is rare in the very young and the very old.

Symptomatology

Bowels.—Prenomitory diarrhoea was a common complaint. In this series 43 cases (65 per cent) had suffered from diarrhoea, especially at the onset. Diarrhoea preceded oedema in 34 cases, while oedema preceded diarrhoea in 4 cases only. The sequence could not be ascertained in the other four cases. The severity of the diarrhoea was variable, the majority had simple diarrhoea of a mild type, but in some patients it was so severe as to simulate cholera. We saw one girl who was actually treated for cholera with intravenous saline injections; later, with the stoppage of diarrhoea, her legs became swollen and she showed a typical picture of epidemic dropsy.

A large number of stools were examined; their colour was variable, yellow, green or white; mucus was seen in the stools of a certain number of patients and sometimes it was associated with blood, thus simulating the stools in dysentery. The remaining patients were constipated and did not give a history of early diarrhoea. Borborygmi, sometimes associated with griping pains, were common even in patients who had no diarrhoea.

Palpitation was a common symptom and varied in severity; 36 (54.5 per cent) complained of it at some time or other. The heart was examined in all cases. Enlargement of varying degree was noticed in 14 (21 per cent), the first sound in the mitral area was clear or accentuated in 52 (79 per cent), while it was replaced by a soft bruit in 11 (17 per cent); in 3 (4.5 per cent) cases it was muffled. The second sound in the pulmonary area was normal in 52 cases, accentuated in 13 (20 per cent) and reduplicated in one. A soft systolic bruit in the pulmonary area was present in 5 (7.5 per cent) cases, and 3 of these had a similar bruit in the mitral area. The aortic second sound was accentuated in 3 cases. Signs and symptoms of grave cardiac failure with dilated heart, venous engorgement, dyspnoea and embryonic rhythm were noticed in 3 cases.

Breathlessness on exertion was another important feature and 26 patients (39.3 per cent) complained of it. The rate of respiration was counted in all cases. It was under 20 per minute in 2 cases, between 21 and 25 in 31, between 26

and 30 in 11, between 31 and 35 in 12, between 36 and 40 in 5 and between 41 and 45 in one; it was not recorded in 4 cases. This shows that the majority of patients had an increased rate of respiration. Thirty-six patients complained of cough and in some of them it was of a very distressing character. In most instances it was dry and irritating, streaks of blood were noticed in the sputum in a few cases. Out of these 36 patients 15 had adventitious sounds (râles and rhonchi) in the lungs especially at the bases, 3 of them were, however, subjects of chronic cough and possibly of bronchitis.

The pulse rate was variable depending on age, degree of cardiac affection and severity of the individual case. The majority of the patients (66.6 per cent) had tachycardia with a pulse rate varying from 90 to 140 per minute or more. The volume and tension were variable.

The blood pressure was measured in 57 cases and in many it was found to be raised.

Blood pressure records

Males

Age	Systolic	Diastolic	Age	Systolic	Diastolic
5	80	50	30	125	85
8	113	78	30	145	85
9	105	75	30	102	66
10	112	60	32	142	90
11	106	80	40	140	68
11	108	65	40	115	75
12	108	70	42	148	90
12	124	54	46	130	72
16	140	90	50	176	100
19	128	90	50	130	76
22	115	65	62	205	105
24	154	82	72	132	65
24	140	75	73	150	76
24	153	88			

Females

Age	Systolic	Diastolic	Age	Systolic	Diastolic
4	106	72	15	125	80
5	88	55	16	130	86
5	125	72	16	128	80
6	103	69	18	132	90
6	100	62	20	134	88
7	102	68	24	110	72
8	122	70	25	108	66
8	116	64	28	118	66
8	128	62	30	132	80
10	100	62	30	125	85
10	122	78	32	124	76
11	120	74	32	112	72
15	118	72	35	124	84

If '100 plus age' be considered as the physiological maximum of systolic blood pressure, it is evident from this table that the blood pressure of 16 males and 14 females in this series was abnormally raised, also that the pulse pressure is raised in 20 cases.

The liver.—This organ was definitely enlarged in 23 patients. Although it was hard to decide, at least in some, whether the enlargement was of recent origin or not, the liver was somewhat tender in many cases.

Cutaneous manifestations.—Edema was a constant sign. It was actually present during our examination in 50 cases, and the remainder had had it previously. As a rule it followed diarrhoea. The swelling seemed to make its first appearance on the front part of the leg, about the lower third of the tibia. It is usually of a plastic nature, so that when the thumb is pressed on it, a small depression is left which disappears in half a minute. It is often at this stage that cases are first diagnosed as epidemic dropsy. In the majority of cases œdema was confined to the limb below the knee, but the thighs, sacral regions and hands showed œdema in some patients. None had œdema of the trunk or face, nor gave a history of it in these sites. A rash was observed in 14 patients, the legs and thighs being the commonest sites for this. It was usually macular or erythematous in type, while peculiar mottling was commonly seen on the inner aspect of thighs. The angiomatous nodules, i.e., sarcoids, were seen in 4 cases only. Increase of pigment in the skin, especially on the forehead and cheeks, was a special feature in a large number of cases. It was most marked when the disease had persisted for a few weeks and when the acute symptoms had more or less subsided.

Fever.—Many patients suffered from fever specially in the acute stage. We recorded the temperature of 57 patients during our examination. Altogether 20 had a temperature over 99°F. and some had a remittent type of fever.

Nervous symptoms.—The knee jerks were tested in all cases. They were normal in 57, increased in 5, decreased in 3 and lost in 1 case only. Three patients with increased knee jerks had patellar clonus also. There was no definite evidence of neuritis, although tenderness of the calf muscles was present in a few cases. Aching of the body and extremities and generalized burning sensation were common subjective nervous symptoms. Many suffered from general asthenia and insomnia. The eyes were examined in every case. The pupils were equal and reacted to light and accommodation; the tension appeared to be normal on palpation, the vision was however hazy in eight patients as a result of the disease, while three complained of seeing coloured haloes around the light at night.

Abortion.—Reports obtained in many villages pointed to the fact that every pregnant woman had aborted or miscarried as a result of the disease, no living child was born for several months in some of the villages, abortions occurring mostly between the fourth to eighth months of pregnancy. There were no special symptoms noted in these cases, labour pains started prematurely and the dead fœtus was expelled. Excepting in one case reported to us there was no excessive hæmorrhage in any case. In some cases hæmorrhagic blisters were seen on the body of the dead fœtus.

Treatment.—In Purulia we had an excellent opportunity of trying the treatment of epidemic dropsy suggested by the senior author and which is that adopted in the Carmichael Hospital for Tropical Diseases. We are grateful to the local authorities for the facilities they gave to us. The Indian Research Fund Association and chairman of the district board kindly gave us grants towards the maintenance of the field work and the civil surgeon of Purulia kindly supplied us the necessary medicines free of charge. He also had this treatment carried out by the district board dispensaries and at special centres opened to combat the epidemic. The principal factors in the treatment that have proved so efficacious in our hands are :—(1) Rice-free diet, (2) rest, (3) initial purgative and (4) administration of tincture ephedra (20 to 30 minims) with 10 grains of calcium lactate two or three times a day. Strychnine and iron were also given in a few selected cases. Ephedrine acts in very much the same way as adrenalin, its action being not so powerful but more prolonged. It counteracts the capillary crisis that occurs in this disease and hastens the process of circulation. Further, large quantities of pseudoephedrine contained in the Indian ephedras have a marked stimulant action on the myocardium. The surgeon to the Purulia Sadar Hospital and the chairman of the municipality visited various centres in the rural areas along with the assistant director of public health and reported to us the beneficial results of treatment with tincture of ephedra and calcium lactate. Advanced cases with organic cardiac changes require subsidiary treatment before the full effect of tincture of ephedra can be obtained. In such cases venesection, glucose and diffusible cardiac stimulants were recommended along with very prolonged rest in bed. We also observed that there was no improvement in those cases where rice as an article of diet was not completely stopped. We have seen several instances of patients who, while under treatment, took rice and had a relapse of the signs and symptoms.

Summary

An historical review of the incidence of the disease shows that the epidemic did not occur every year. Although small outbreaks occurred in previous years, 1934 was the only year with a big epidemic and high mortality rate.

Selection.—Although all the members of a family were on the same diet, the severity of symptoms varied enormously in those affected while some members remained quite free from the disease. Children under four years of age in this series entirely escaped, probably because they usually consume small quantities of rice. The poor labouring class living only on freshly-husked rice did not contract the disease. Servants from this class, having meals at their masters' houses, became affected with the disease

but they did not communicate it to other members of their families.

Stored parboiled rice and mustard oil are two suspected articles of diet in the diseased families. Patients recover quickly after the stoppage of rice; relapses almost invariably occur if rice is resumed early.

Gram-positive organisms of the 'vulgatus' group were isolated from the stools of patients, some strains agglutinating with the sera from convalescent patients. The strain isolated in Calcutta agglutinated with the sera collected at Purulia. This important finding shows the possibility of preparing anti-toxic sera for curative purposes.

The symptomatology has been described. The increased pigmentation of the skin is an interesting new observation.

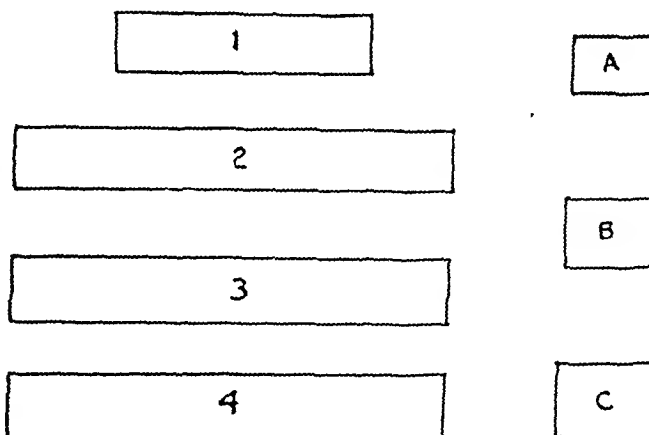
Treatment with tincture of ephedra and calcium lactate proved effective.

Appendix

Outbreak of epidemic dropsy in the engineering camp at Purulia.

The senior students of the Bengal Engineering College have been sent to Purulia for survey training every winter for the past fifty years. Unfortunately the camp during last winter had to be dissolved owing to an outbreak of epidemic dropsy among the students.

A widespread epidemic of an alarming character was prevalent in Purulia and its suburbs last year and it was at its worst during the month of November when the camp was actually started. A batch of sixty-three students arrived on the 5th November, 1934, and encamped within about a mile of the town. Tents were placed according to the following plan.



There were four tents (1, 2, 3 and 4), placed at a distance of about fifteen feet apart and three adjacent ones to serve as kitchens (A, B and C). The Mohammedan students who were only seven in number occupied tent no. 1 with its adjacent kitchen A, while the Hindus numbering fifty-five used the remainder of the tents and kitchens. There was one Anglo-Indian student who messed with the Mohammedans. The water supply for both Hindus and Mohammedans was from the same tank. There was no special latrine arrangement. Provisions and food were purchased locally from the Purulia market, the Hindus bought rice from a local Hindu *bania* and the Mohammedans bought theirs from a Mohammedan dealer. Both sections used mustard oil prepared in the local mills and their supply of ghee was brought from Calcutta. With regard to other articles of diet, the Mohammedans had a mixed

diet, while the Hindus lived more or less on strict vegetarian diet.

Owing to the prevalence of cholera most of the students were inoculated against the disease; a small number refused. The camp carried on without incident till 7th December, when ten Hindu students complained of diarrhoea; frightened by this, most of the remaining students were inoculated. On the 13th of December more of the Hindu students had looseness of the bowels and the assistant surgeon from the local civil hospital was called in. He found that thirty-five Hindu students had gastro-enteritis and about twenty had oedema of the legs. He visited the camp next day and saw altogether twenty-seven students with diarrhoea and oedema, nineteen with diarrhoea only and four with oedema only.

The menial staff were twenty in number, of whom fifteen were Hindus and six were Mohammedans. Seven of the former were affected while none of the latter had any symptoms. One student and two menials showed serious symptoms.

This created a panic and the camp was dissolved forthwith. The students were given leave and advised to go to their respective homes and one was admitted to the Howrah General Hospital for treatment.

We visited the college after the students had returned, and found that practically all of them were apparently cured. As far as our enquiry goes, there was no subsequent outbreak in the hostel at the college among the other students nor in the families of the victims.

We collected samples of rice and mustard oil used by the affected students. The rice was of the 'Ramsal' type, the grains were of various colours indicating admixture of different kinds. The water test showed opacities in over eighty per cent of the grains and on culture there was a heavy growth of bacilli of the 'vulgatus' group. The mustard oil was analysed in the Bengal Public Health Laboratory and found to be adulterated. We are thankful to Mr. McDonald, the Principal of the Bengal Engineering College, for the facilities given to us.

Summary

Eighty-three per cent of Hindu students in the camp were affected, while all the Mohammedans escaped. The disease could not be contagious nor water-borne as the students of both classes mixed freely with each other and had the same water supply. The diet was the principal factor of difference between the two classes, provisions being supplied by different contractors. The rice used by the affected students was heavily infected. The outbreak was explosive in character, and at the outset the disease was characterized by diarrhoea in almost every case. There was no spread of the disease to the students' families nor in the hostel of the Bengal Engineering College to which they returned after the epidemic.

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THE OCULAR COMPLICATIONS OF EPIDEMIC DROPSY

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THE main ocular complication of epidemic dropsy is glaucoma of the primary non-inflammatory type, and the eye remains quite white even in cases in which the tension is extremely high. Formerly it was thought that the increased intraocular tension was a late manifestation of the general disease, but in the outbreaks in 1932, 1933, 1934 and 1935 many cases of this type of glaucoma were seen with slight or no other general signs of the disease. In the latter category, some gave a history of having contracted the disease in a previous epidemic, but, on the other hand, a number gave a negative history of any other signs or symptoms of the disease, so that in some cases the toxins showed a special predilection for the intraocular capillary endothelium, while, in the majority of cases, this endothelium was involved with the general endothelial system of the body.

Glaucoma is more often seen in persons between the ages of 20 and 35, but cases of high intraocular tension also occur in Indian boys and girls from 8 to 15 years of age.

The early symptoms of glaucoma to be noticed by the patient are rainbow colours, haloes around lights, and gradual diminution of vision. These haloes are at first transient but as the disease becomes more marked they become permanent. Both eyes are nearly always affected at the same time, although some patients give a history of one eye being affected first. The disease is not accompanied by pain although occasionally there is a sensation of discomfort or heaviness in the eyes. Nausea and vomiting are absent. In all cases the conjunctiva and sclera are not affected except for the turgescence of the anterior ciliary veins which stand out prominently, and in those cases in which congestion of the conjunctiva was observed it was always explained

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by the previous instillation of eserine. The corneas may be normal or they may have a steamy or ground-glass appearance depending as a rule upon the amount of increased intra-ocular tension, but in all cases examination with the corneal microscope shows evidence of corneal œdema. The rainbow rings—which are due to œdema of the cornea are always a marked symptom of the disease and their presence is an important point in distinguishing the glaucoma of epidemic dropsy from simple primary glaucoma, as in the latter variety the rainbow haloes are not always present. As a result of seeing these colours, patients suffering from this type of glaucoma come for treatment much earlier than those suffering from the ordinary chronic simple variety.

The anterior chamber is never shallow as in other types of glaucoma; it is either normal or deeper than normal and there is never any pushing forward of the lens and iris. It is of great interest to note that this variety of glaucoma is of the anterior segment type, in contradistinction to the posterior segment type in which the anterior chamber is shallow. Swelling of the vitreous body which usually plays a predominant part in the pathogenesis of glaucoma is absent and therefore swelling of this body is not necessarily an essential factor in the causation of glaucoma. The increased intra-ocular pressure is due to the dilatation of the capillaries of the whole uveal tract, followed by an increased permeability of the endothelial walls which leads to an increased output of intraocular fluid in the anterior segment of the eye.

In the photomicrographs of the filtration angle it will be seen that the canal of Schlemm and the tissues in the immediate vicinity do not show any abnormalities, either in cellularity or increased fibrosis. The epithelium of the ciliary processes also does not show any change. Marked dilatation of the vessels is seen in the subepithelial connective tissue of these processes. There is also an enormous dilatation of the capillaries of the choroid. There is no evidence of any inflammatory process to be found in the whole of the uveal tract.

Recently I have been 'tapping' the anterior chamber and have been able to take off 0.25 c.cm. of aqueous humour. This fluid has been examined for me at the School of Tropical Medicine, Calcutta, and in a number of cases the presence of a toxin containing an 'H' substance resembling histamine in its action has been proved to be present. At the same time, controls with normal aqueous humour did not show the presence of this substance. This is a great advance in our knowledge of the ætiology of epidemic dropsy and as the epithelial cells of the ciliary body do not show any damage microscopically, this toxin is probably produced from specific micro-organisms in the alimentary canal.

Examination of the blood serum of patients suffering from epidemic dropsy shows that the total proteins have diminished and this diminution is due to a considerable decrease in the albumin content. As the protein content of the serum is responsible for the physical state of the blood, so these changes must necessarily have a great influence on the various physical and chemical properties of the serum. Examination of the aqueous in epidemic dropsy glaucoma shows that the percentage of albumin is greatly increased while the globulin remains the same; the normal ratio of albumin to globulin is 0.45 to 1.0 whereas in the aqueous of epidemic dropsy glaucoma the albumin is more than the globulin in the ratio of 2.5 of albumin to 1.0 of globulin. Examination of the crystalloids in the aqueous humour shows no deviation from the normal.

The pupil is normal in appearance and reacts well to light and in accommodation. Examination with the corneal microscope shows no evidence of inflammation in the aqueous nor the iris. Pathologically we know that the vessels in the iris are dilated, but, owing to the heavy pigmentation of the iris in the Bengali, the vessels in the living eye cannot be seen. The ciliary body, like the iris, is not involved except that weakness of accommodation is nearly always present. The media and lenses are normal. Even in advanced or absolute glaucoma of this type lens opacities are never observed. The fundus cannot always be seen clearly owing to corneal œdema, but in most cases glaucomatous cupping is not present except in long-standing cases of three or four months' duration. Cupping and atrophy of the disc become more marked according to the duration of the disease. It is of interest to watch the formation of the glaucomatous cup; this is gradually formed by enlargement of the physiological one. The fundi were examined in a large number of cases, both before operation and also after operation when the intraocular tension had become normal but no gross changes were found. The veins were either normal in size or showed some engorgement and they appeared much darker than normal. Retinal hæmorrhages do occur but are extremely uncommon, and I have never seen any new formation of blood vessels as is seen in other parts of the body. Retinal exudations do not occur.

The outstanding phenomenon of this variety of glaucoma is the extremely high tension. It is rarely below 50 mm. of mercury (Schiotz); tensions of 70 to 100 mm. are quite common, and I have seen some cases in which the intra-ocular tension was over 100 mm. The tension as a rule remains high constantly but cases occur in which it varies tremendously, even dropping to normal for a short time. Both eyes are affected and I have seen a few cases in which one eye was affected first, but invariably the other was involved a few weeks later.

The tension is usually about the same in both eyes. The optic nerves seem to be able to resist the high tension for a number of weeks before any evidence of atrophy is found in the visual fields, but unless the tension is relieved optic atrophy of some degree invariably results, at times progressing to complete blindness. Cases are seen in which the glaucoma disappears spontaneously after the general disease has disappeared, leaving defects in the visual fields dependent on the duration of the increased intraocular tension. I shall not discuss in detail the defects in the visual fields as they are much the same as those in chronic primary glaucoma. In early cases there is a depression of the peripheral fields starting in the nasal quadrants. In later stages the fields show a concentric depression. The colour fields react in the same way as the fields for white, and shrink as the fields become depressed. Examination of the central field shows a pericæcal depression and the scotoma is continuous with the blind spot to a varying extent.

Some observers are of the opinion that glaucoma does not occur in cases in which there is profuse diarrhœa, but this is not my experience, and I have seen many cases in which high intraocular tension has been accompanied by diarrhœa. Purgation produced by the administration of salines has no effect in lowering intraocular tension in this type of glaucoma.

Treatment.—In the treatment of glaucoma, the important thing is to eliminate rice completely from the diet, and to wash out the alimentary canal by the administration of purgatives and large amounts of fluid, in the hope that the offending organisms and their toxins may be eliminated from the body. In very

any length of time. The dietetic and medicinal treatments of this type of glaucoma are most unsatisfactory. Some patients get well without any therapy, but invariably a damaged visual field results depending upon the severity and duration of the disease. Purgatives and diuretics are of little use even to reduce the tension to a lower level. Miotics, such as pilocarpine and eserine, which are still commonly used by many doctors are absolutely useless, so much so that they have now been abandoned even as a temporary measure in the treatment of this variety of glaucoma in the Eye Infirmary, Medical College, Calcutta. I cannot impress too much upon medical men the importance of never prescribing eserine drops. Eserine is a very potent drug causing pain in the eye and symptoms of irritation. It has the added disadvantage of causing hyperæmia of the conjunctiva thus making operative treatment much more difficult.

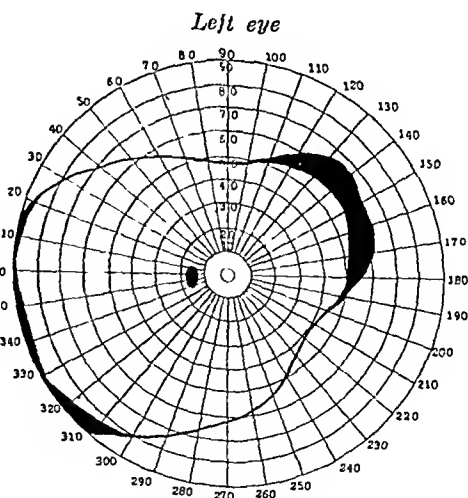
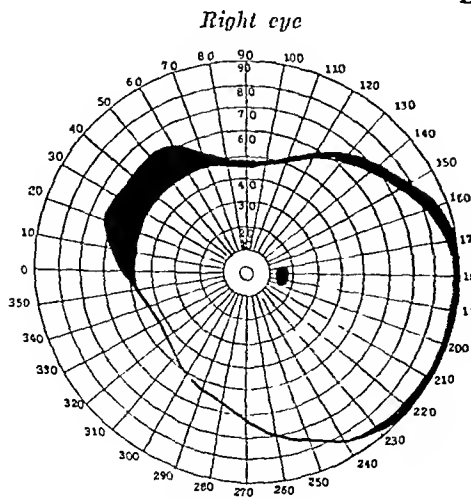
As long as the visual fields show no defect there is no necessity for carrying out an immediate operation. It is possible that the general disease, and with it the glaucoma, will be cured before the optic nerves become permanently damaged by the increased intraocular tension. The patient should be kept under observation and should refrain from eating rice, but, as soon as the defects in the visual fields become evident, operation should not be delayed.

Case 1.—Hindu male, age 24 years.

Previous history.—No history of previous attack of epidemic dropsy.

Present history.—Contracted epidemic dropsy three months ago which was characterized by swelling of the feet. History of seeing rainbow haloes around lights for about two months.

CHART I
Early case



White object 33 + 1000

early cases, the most practical therapeutic measure is to get the patient away from the endemic area, as it is difficult for the average Indian patient to refrain from eating rice for

Right eye.—Cornea—clear, anterior chamber—deep, pupil—active, tension—65 mm. (MacLean), vision—6/9.

Left eye.—Cornea—clear, anterior chamber—deep, pupil—active, tension—60 mm. (MacLean), vision—6/9 (see chart I).

Case II.—History of an attack of epidemic dropsy since 7th February, 1934. Characterized by swelling of feet, diarrhoea, pains in arms, palpitation of heart. Complained of occasional haziness of vision in both eyes since the attack. Haloes round light.

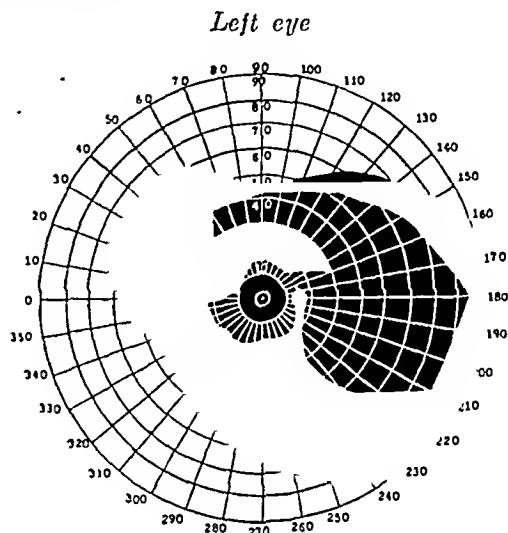
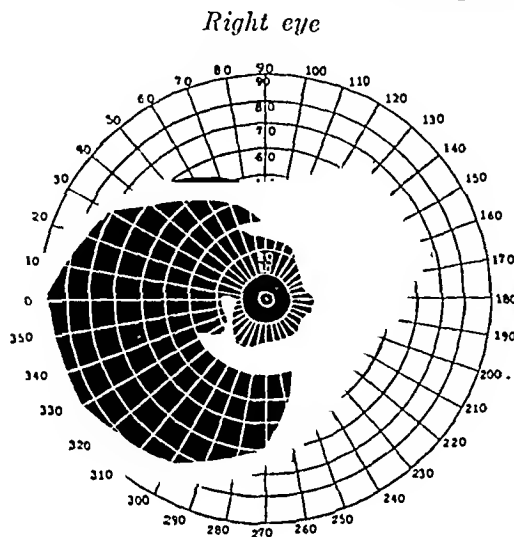
Patient used to take rice.

Right eye.—Cornea—clear; A. C.—deep; pupil—active; tension—56 mm.; white object ३३३ + १००० and vision 6/6.

Left eye.—Same as the right eye.

One would think that this type of glaucoma, being of all known varieties a primary glaucoma, a temporarizing operation could be done, as the patient will get well spontaneously, when the cause is removed, and that it is only necessary to keep the tension down by repeated anterior sclerectomies until this end is achieved. In practice, this is not sufficient, as it takes a

CHART II
Moderately advanced case
Showing Seidel's and Bjerrum's signs



White object ३३३ + १०००

Case III.—Hindu female, 24 years old.

History of an attack of epidemic dropsy for last one month, characterized by swelling of feet, palpitation of heart and seeing haloes round light.

Present history.—Patient contracted the disease in Jessore.

Family history.—Other members of the family have been suffering from the same disease.

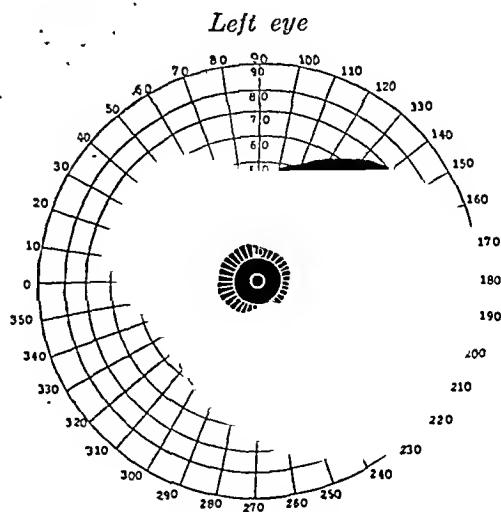
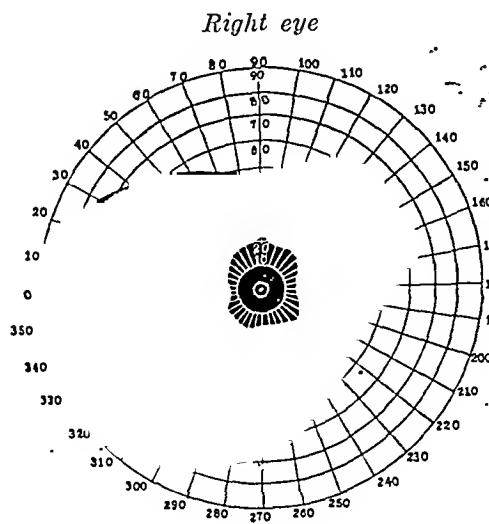
Right eye.—Cornea—clear; A. C.—deep; pupil—active; tension—67 mm.; white object ३३३ + १००० and vision 6/6.

Left eye.—Same as the right eye.

Both eyes.—Trophined B. H. I. done; tension—normal after operation.

considerable time to get the disease under control in spite of the withdrawal of rice from the diet and the use of eliminative treatment. I have recently carried out anterior sclerectomies to tap the aqueous humour for examination, but in practically all cases the tension goes up again in the course of a few days. By far the most successful method is the Elliot operation with a 1½ mm. trephine. During the operation, as may be expected, the aqueous escapes under great pressure. A small peripheral

CHART III
Late case
Showing markedly depressed fields



White object ३३३ + १०००

PLATE IV



Fig. 1



Fig. 2

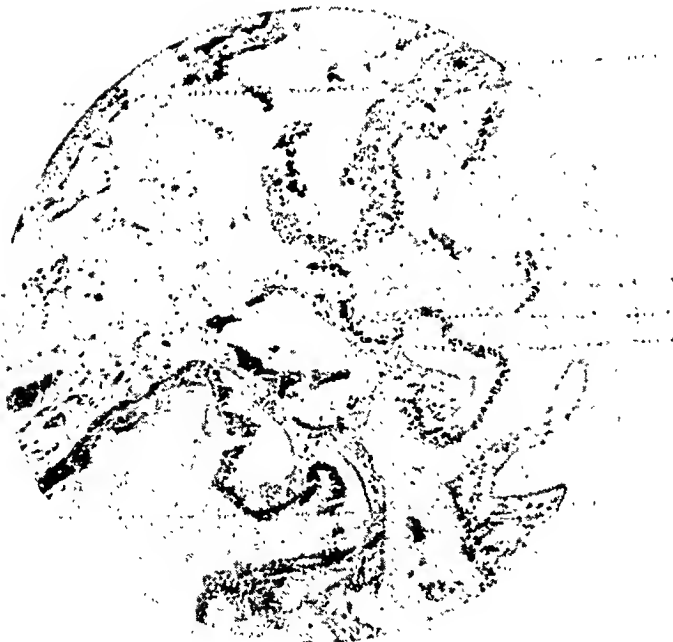


Fig. 3

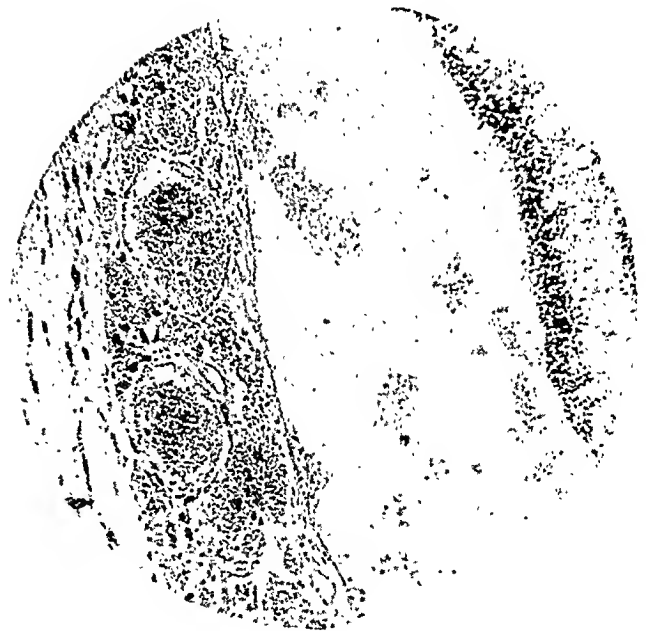


Fig. 4

iridectomy is done. I have never seen intra-ocular hæmorrhage at the time of operation, even when operating on eyes with extremely high tensions. The results of trephining are excellent and the tension seldom rises again once the decompression is carried out. In the course of time, when the general disease is cured, the trephine hole closes. The operation is simple and excellent in its results, and in the large number of trepanations that I have done in this type of glaucoma I have been fortunate enough never to lose an eye.

Discussion.—It is of interest to note that the optic atrophy is caused by the increased intra-ocular pressure alone and cannot be attributed to the toxins that cause epidemic dropsy. Once the increased intraocular tension is relieved by operation and the tension of the eye remains normal, optic atrophy ceases to progress. In a number of cases I have observed the fields carefully for a considerable time after operation, in a few patients up to a maximum period of 6 years, and invariably the field has remained the same or has slightly improved after operative treatment.

This problem in the elucidation of the ætiology of epidemic dropsy is of extreme importance, not only in the treatment of glaucoma associated with this disease, but in the elucidation of all glaucomas. It need hardly be pointed out how very common glaucoma is in India and its responsibility for a large amount of the partial blindness and blindness that is to be found in every town of this vast country. We are still, in the words of Lieut.-Colonel R. L. Wright, 'in almost complete ignorance of the essential origins of such local changes in the eye, although it is hardly likely that we can dissociate them from the generalized phenomena of a similar nature throughout the body due to the same original causes'. If we can find out the organism and its toxin that is the cause of epidemic dropsy, we have advanced a considerable distance in the elucidation of the whole glaucoma problem, and will have conferred a benefit, not on Bengal and India alone, but on the world in general, as in all countries primary glaucoma is extremely common. I have no doubt that in a short time the ætiology of the disease will be definitely cleared up, and so one can look forward to the day when a great part of the problem of glaucoma will be solved by therapeutic methods or methods of prevention.

The case notes and the charts of the visual fields of three cases are given; these maps show the visual fields of early, advanced, and late glaucoma associated with epidemic dropsy.

My thanks are due to Lieut.-Colonel R. N. Chopra, I.M.S., Capt. C. L. Pasricha, I.M.S., and the staff of the School of Tropical Medicine, Calcutta, for their assistance in the examination of the aqueous humour, and to Dr. N. De, Professor of Pathology, Medical College, Calcutta, for making the photomicrographs.

PATHOLOGY OF EPIDEMIC DROPSY

By M. N. DE

and

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AMONGST the protean manifestations of the disease which we commonly call epidemic dropsy, the changes in the skin constitute one of the most puzzling features in its pathology. Although, in the present unsatisfactory state of our knowledge regarding the true nature of the malady, we do not know the causes that bring about these changes, yet the morbid anatomy and the histopathological changes in the skin have been more or less accurately studied.

Clinical lesions: The skin.—The skin may be affected in epidemic dropsy in a variety of ways. In some cases, particularly in the early acute stage of the illness, the lesions may be limited entirely to the superficial layers. In such cases, the skin shows a very characteristic blotchy erythema with a somewhat vivid purplish-red coloration as if there is an acute dermatitis. This may be found not only in the dependent parts of the body but also in other areas where the question of hyperæmia due to gravity does not arise. There may not be any gross swelling and œdema nor any pain nor tenderness. Such a picture is often associated with a low intermittent type of pyrexia which yields remarkably to injections of adrenalin. This erythema is due to the dilatation of the superficial vessels of the skin, as slight pressure will often remove it although it returns almost immediately the pressure is removed. A very curious phenomenon is sometimes met with in such cases. A severe uncomfortable aching pain is felt underneath the finger and toe nails. This becomes, at times, so distressing that patients feel relief when they apply a tight pressure bandage over them. After some time, which may extend over some weeks, varying degrees of swelling and

DESCRIPTION OF PLATE IV.

Fig. 1.—Photomicrograph of the filtration angle of the eye from a case of epidemic dropsy.

The channels of absorption (canal of Schlemm and tissues around) do not show any abnormalities either in cellularity or increased fibrosis.

Figs. 2 and 3 show different parts of the ciliary body. The epithelium of the ciliary processes do not show any change. Marked vascular dilatation is present in the sub-epithelial connective tissues. There is no evidence of any inflammatory processes.

Fig. 4.—Photomicrograph of the choroid from a case of epidemic dropsy showing enormous dilatation of the capillaries. Such a vascular change in the choroid coat often gives an impression of hæmorrhage although actual extravasation of blood in the tissues does not take place. The wide gap between the vascular and pigmented layer has been apparently caused during the preparation of the specimen.

œdema characteristic of the disease appears, particularly in the lower extremities.

When a piece of skin thus affected is excised and subjected to a microscopic examination, all the changes are found to be confined to the papillary blood vessels which are dilated and engorged. There is no appreciable involvement of the deeper subcutaneous adipose tissue. No inflammatory reaction is noticed in any part of the skin. This change may disappear as the patient improves and the skin surface may almost completely regain its normal colour, leaving behind some degree of pigmentation. In some cases the degree and intensity of such pigmentation is so marked that a fair-skinned person often looks quite dark.

In other cases, the disease starts with marked swelling and œdema of the lower extremities which may definitely pit on pressure. This appearance is very characteristic. The swelling is tense, somewhat shiny, and usually there is a deep subcuticular reddish flush. Some pain and tenderness may be elicited specially on deep pressure, and the parts feel warmer. In very severe cases, ecchymotic patches with a deep chocolate colour may be found in different parts of the body, specially in those areas where there is much fatty tissue, as for example in the buttocks, and thighs.

The histopathology of these subcutaneous manifestations have been adequately studied and reported by Acton and Chopra (1927), Shanks and De (1931), and De (1933). The most characteristic changes are seen in the blood vessels of the subcutaneous fatty tissue (plate V, figures 1 and 2) which are almost transformed into a capillary angioma. This vascular dilatation, though present in the superficial layers of the skin, is not very striking. The ecchymotic patches mentioned above are found to consist entirely of such telangiectasis instead of actual hæmorrhage into the tissues.

Development of fleshy dark-red cutaneous warty growths and nodular excrescences constitutes another remarkable feature of the disease. Usually they are met with in persons who suffer from some active manifestation of the illness. The time which elapses between the appearance of the first symptom and the development of these nodules varies from 3 to 6 weeks; but this may be shorter if the patient had previously suffered from an attack of the disease. It is very curious that the appearance of such cutaneous nodules does not seem to be always related to the severity of the illness; neither does it depend on the intensity of the lesions in the skin. For instance, in a person with marked swelling of the legs and vascular manifestations, there may not be any nodules in the affected parts, whereas they may be seen to develop on the inner aspect of the pinna of the ear or in the skin over the mastoid process where swelling is never noticed. Gravity seems to play

very little part in their formation, as the nodules are mostly situated above the knee.

In the majority of the cases, the number of these nodules is small, varying from a few to a dozen or so; but this is by no means constant. We have seen cases in which there has been



Fig. 4.—The presence of pre-existing inflammation favouring the development of the nodular eruption at that particular site. At the time of an attack of epidemic dropsy, this patient had a small pimple over the area where the nodule developed. There were no other nodules in any other part of the body.



Fig. 5.—A case of epidemic dropsy in which a large number of cutaneous nodules have developed.

only one solitary growth and also others in which their number reached over a hundred (figure 5). Here again, we cannot trace any definite relationship between the number of the eruptions and the severity of the illness. In

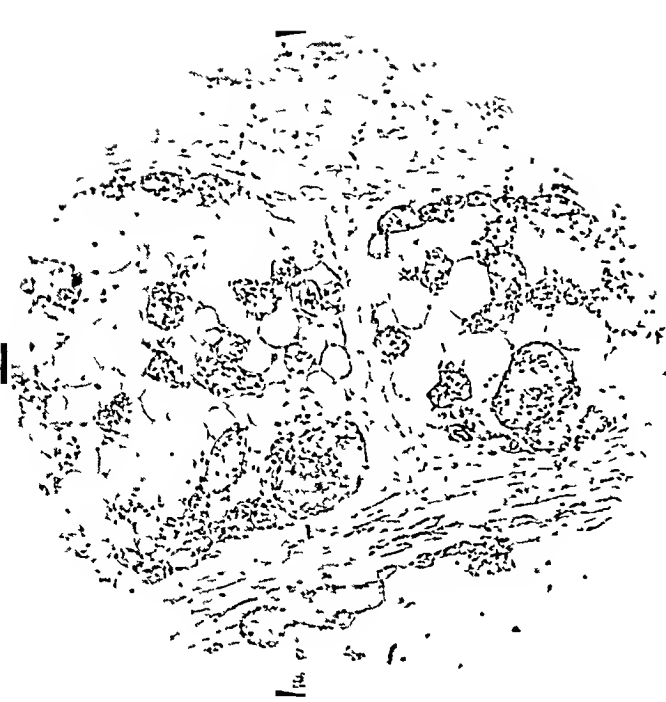


Fig 1—A low-power view of a section of skin from a case of epidemic dropsy showing the amount of vascular dilatation in the subcutaneous fatty tissue

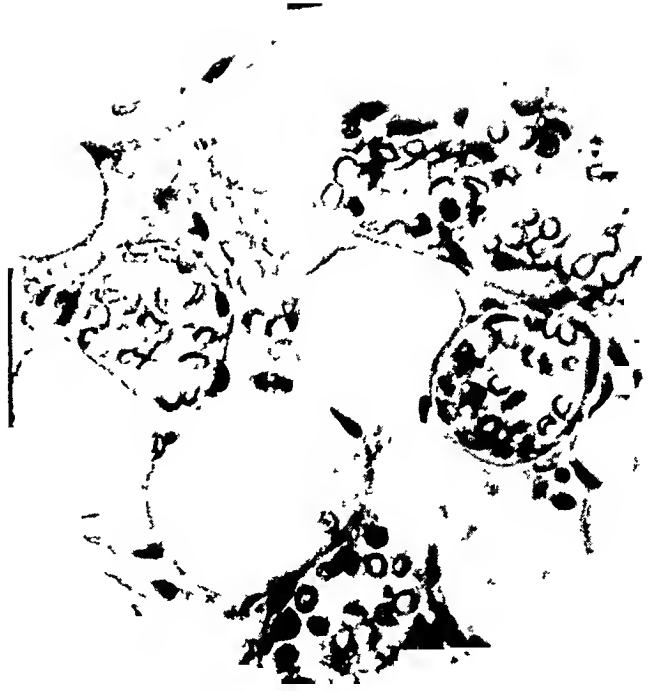


Fig. 2—A magnified view of figure 1, showing the fat cells (clean spaces) and dilated capillary blood vessels



Fig 3—Photomicrograph of a section from a cutaneous nodule showing widely dilated vascular spaces along with the angioblastic tissues. The blood vessels are lined by a single layer of endothelial cells. The stroma consists of loose areolar tissue

fact, we have seen instances in which many nodules have been met with in persons complaining of only trivial symptoms. It has also been noticed definitely that an area of skin which had been the site of an eruption in a previous attack of epidemic dropsy is more prone to the development of a nodule during a subsequent attack of the disease. Another peculiarity which has been seen is the special predilection of areas of skin and mucous surfaces which are the seats of a pre-existing inflammation (figure 4). Trauma, irritation due to rubbing of clothes or scratching, a septic nail, ulceration of the gum in pyorrhœa alveolaris, and occasionally inflammation in the nose, are all predisposing factors to the formation of such nodules.

The size of these growths varies widely, from that of a small lentil to a moderately big lemon or a tomato. Usually, they resemble a big pea or a small ground-nut. They may be either sessile or pedunculated; in the latter case, they sometimes drop off when they are inadvertently scratched; this leads to a profuse and often prolonged hæmorrhage. No pain or tenderness is present and sensation is intact though very much diminished. When such a nodule is either pricked with a needle or scratched, bleeding starts and continues. In some cases, the nodules may burst spontaneously; this leads to a very severe hæmorrhage which may continue for hours, or even days. Instances have been seen in which the loss of blood through the rupture of a nodule was so large that the hæmoglobin dropped from normal to 40 per cent.

The morbid anatomy of these cutaneous nodules is very characteristic. When cut, the substance is found to consist of a soft fleshy mass arising from the superficial portion of the skin. On squeezing, a serosanguineous fluid oozes out. In larger nodules, widely dilated spaces may be detected by the naked eye or there may be hæmorrhagic areas. The histological examination of such a nodule reveals the structure of a capillary angioma with marked telangiectasis and containing much angioblastic tissue (plate V, figure 3). In a fairly big nodule from a case of some duration, one notices many widely dilated vascular spaces along with the angioblastic tissue elements. These spaces are lined by a single layer of endothelial cells, but no muscular or elastic tissues can be demonstrated in their walls. This lack of proper supporting structures in the vascular walls appear to be the chief cause of the prolonged bleeding in these cases. All the different stages in the formation of new capillary vessels may be seen in a nodule. There is at first a multiplication of the endothelial cells by mitosis, which may be seen in large numbers in a growing nodule. A vacuole now appears in the cytoplasm of a newly-formed endothelial cell pushing the nucleus to one side. This vacuole enlarges and more nuclei appear surrounding the former till

ultimately it is transformed into a capillary which communicates with the neighbouring ones, as elements of the blood are now seen inside the vacuole. After this formation, the lumen of the vessels is dilated, obviously on account of the pressure of the blood inside them. These vessels, however, remain more or less in an embryonic condition, as even in the case of a very large and widely dilated one no trace of any muscular or elastic elements can be discerned in the wall.

In a nodule which has not been irritated or whose surface epithelium is intact, no evidence of an inflammatory reaction can be seen inside the angioblastic tissues; but, if there is any irritation or if it is infected through a breach of the surface epithelium, and if it ruptures spontaneously and ulcerates, a marked inflammatory reaction may be found on the surface as well as to a considerable depth below. Under such circumstances, the upper portion of the nodules resembles a highly vascular granulation tissue.

From a study of a large series of such nodules from different cases, we have concluded that the primary site of their origin is the superficial layer of the cutis vera in the papillæ of the skin. These areas gradually enlarge and produce a swelling over which the epidermis is found to be stretched as a thin layer. Sometimes a widely dilated blood space may be traced up to this thinned-out epidermis and a mass of blood corpuscles found collected just underneath the covering layer. It will thus be seen how the slightest trauma may lead to the rupture of such a nodule with the escape of a considerable amount of blood from the communicating vascular spaces below. The deeper layer of the cutis vera with the sweat and sebaceous glands presents a normal appearance. In the subcutaneous adipose tissue, however, one may see varying grades of vascular changes depending on the severity of the cutaneous lesions and the duration of the disease.

The development of such nodular growth is not confined to the skin surface only but may also take place in mucous surfaces such as the gum, cheek, interior of the nose, and tongue (figure 6). A pre-existing chronic inflammation in these areas certainly predisposes to such formations although this is by no means always constant. They appear as soft pinkish-white fleshy outgrowths which may grow to a fairly large size. There is very early ulceration, and bleeding takes place on the slightest trauma. The loss of blood from an epulis-like growth of moderate size on the gum may sometimes take on such enormous proportions that it may cause alarming symptoms. A pregnant woman carrying for seven months had an attack of the disease with a few nodules on the skin and a small 'epulis' on the gum; one day whilst taking her meal she injured the growth which bled so profusely and for such a long

time that she became markedly anæmic and aborted. Cases of this nature are often met with in endemic areas.

Although there is so marked a tendency for these outgrowths to bleed, no alteration in the coagulation time of the blood could be shown—the average time being $2\frac{1}{2}$ to 4 minutes. Another important feature of these cases is the behaviour of the skin when the nodules are dealt with by surgical operation. So long as an incision is not made directly over a nodule, there is no abnormal bleeding. Besides, the healing power



Fig. 6.—A nodule on the dorsum of the tongue arising from the mucous surface after an attack of epidemic dropsy. There were no other nodules in any other part of the body

of the skin and mucous surfaces is excellent, as in all our cases in which surgical removal of nodules was undertaken, the healing always occurred by first intention.

The heart.—The effects of the disease are not only present in the skin but also in other parts of the body. It is commonly known that the cause of death in fatal cases of epidemic dropsy is cardiac failure. The heart in such cases has been very critically examined clinically (Chopra and Basu, 1930; Chopra and Bose,

1933), but on account of lack of a sufficient number of necropsy examinations the morbid anatomy and finer histological changes have not been studied as they ought to have been. The very few cases in which the heart was examined after death revealed some very remarkable features. The organ is enlarged, the right side being affected more than the left. The cavities are dilated and their muscular walls are thinner. In one of our cases there was a very interesting condition found in the epicardial layer of fat. It was intensely injected and there were patches which looked like petechial subserous hæmorrhages. No inflammatory exudate could be found, either on the serous surfaces or inside the pericardial cavity, which contained only an excess of clear yellow fluid. When this was subjected to a microscopic study, it was found to show the same type of vascular change as was found in the subcutaneous fat, namely, an increase in the number of the capillaries and their enormous dilatation, some of the latter having almost coalesced, producing a gross picture of 'petechial hæmorrhage'. The individual muscle fibres, both in the left as well as the right ventricles, did not show any detectable evidence of damage but they were widely separated from one another by enormously dilated intermuscular capillaries. Such a histological picture is not met with in any other disease which affects the heart. This wide separation of the muscle fibres obviously leads to inefficient functional capacity as it interferes with an effective and co-ordinated contraction of all the fibres.

The eye lesions.—The occurrence of primary glaucoma in the course of the disease constitutes one of the most distressing features of epidemic dropsy. This complication has been very frequent in the epidemic of this year, over 10 to 12 per cent of the total number of cases having suffered from some degree of it. It is very insidious in its origin and it bears no relationship to the degree of lesions in the skin and other organs. It may come on in a person without any external manifestation of the disease. A house surgeon of the Eye Infirmary of the Calcutta Medical College suddenly complained of typical symptoms of a hyperacute primary glaucoma but no physical evidences of epidemic dropsy could be elicited. On careful inquiry he made the statement that he had a mild attack of the disease 2 to 3 months ago with some swelling of his legs while he was in charge of a subdivision in a district in Eastern Bengal. The onset was so sudden and the symptoms so acute that immediate surgical relief had to be sought.

Out of a small total of 4 cases on which autopsy could be performed, glaucoma was present in only one. The patient died from a congestive type of cardiac failure. Although no cutaneous nodules could be seen, both the skin and the internal organs showed changes

characteristic of the disease. In the eye, the sclero-corneal junction was subjected to a careful histological study but no abnormality of any kind could be detected in it, the channels of absorption including the canal of Schlemm being normal. The ciliary processes, however, showed enormously dilated capillaries with some amount of oedema in the subepithelial connective tissues. Besides this, there was a ring of enormously dilated and engorged blood capillaries lying between the choroid and the sclera. This condition was so very marked that they might be easily mistaken for retinal hæmorrhages, but no actual extravasation of blood could be found under the microscope. How far such pathological changes would contribute to the development of glaucoma is a matter for the ophthalmologists to decide, but there appears to be an altered permeability of the capillaries and an increased functional activity of the ciliary processes, resulting in an overproduction of the aqueous humour which cannot be drained away sufficiently rapidly and which would naturally accumulate, producing an increased intraocular tension.

Other pathological changes.—Epidemic dropsy has a very injurious effect on the female reproductive organs. Let us confine our observations to the changes in the uterus. In the muscular layer one can see many cavernous dilatations of blood vessels lined by a single layer of endothelial cells and the endometrium full of innumerable smaller vessels engorged and dilated as if it were in a hæmorrhagic condition. The stroma is scanty and unhealthy, and the endometrial glands are small and atrophic. In an endemic area of epidemic dropsy, the majority of the infected pregnant women abort and the infected women of child-bearing age hardly ever conceive. These facts can only be explained by the above-mentioned pathological alterations in the muscular as well as the endometrial layer of the uterus, which are brought about by the disease.

The changes in the organs of internal secretion have not been sufficiently investigated. There is undoubtedly increased vascularity and a larger amount of colloid in the anterior lobe of the pituitary gland, but the picture is not so remarkable as to lead to any practical conclusion. The suprarenal in one of our cases showed definite inflammatory reactions mainly around the central vein. A moderate degree of round cell accumulation could also be seen diffusely scattered throughout the substance of the medullary part. This sort of subacute or chronic, diffuse or localized adrenalitis may also be encountered in cases other than those of epidemic dropsy, and unless a sufficient number of autopsy cases are examined the significance of such findings cannot be properly assessed.

The results of the histological examination of the spinal cord and peripheral nerves have

(Continued at foot of next column)

CUTANEOUS MANIFESTATIONS OF EPIDEMIC DROPSY

Part I

A CLINICAL STUDY

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OUTBREAKS of epidemic dropsy do not occur every year; in certain years a widespread epidemic arises followed by a period of quiescence. Further, it has been also noticed that the cases of one epidemic often differ in their severity and chief manifestations from those of another. These variations in morbidity are difficult to explain. During the epidemic of 1926 a large number of patients were seen with skin affections, but these were of rare occurrence in the years 1929 and 1932. During 1934 there was a big epidemic, not only in Bengal, but in the contiguous areas of Bihar and the United Provinces; the Bengalis domiciled in these areas suffering most. Cutaneous manifestations of this disease were seen in cases from every locality and they were more prevalent during this epidemic than in any other we have seen. Erythematous rashes and sarcoids were of common occurrence, and a new type of skin manifestation was observed during the last outbreak; the skin of the exposed parts, especially of the face, was hyperpigmented, and this was most commonly observed during our investigations—which has been discussed in detail in another paper—in Purulia from November 1934 to February 1935.

During the year 1934, 39 cases of epidemic dropsy were admitted into the Carmichael Hospital for Tropical Diseases. Of these 15 showed cutaneous lesions of some form or other;

(Continued from previous column)

been negative. We noticed—a marked gross vascularity of the pia-arachnoid membranes of the cord but the microscopic study of the internal structures did not reveal any abnormality. In the peripheral nerves, we saw definite vascular engorgement in the perineural sheaths, but evidence of neuritis could not be detected.

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9 had a rash only, 4 had sarcoids only, 1 had both a rash and sarcoids, while another had a rash and pigmentation.

Clinical types of skin lesions.—T. D., a Hindu male, aged 25 years, teacher by profession, was admitted into the Carmichael Hospital for Tropical Diseases on the 19th September, 1934. He complained of formation of reddish nodules on different parts of the body and swelling of his legs. He stated that he had had the nodules for one month and the swelling for a fortnight only. The swelling was particularly marked in the evening after the day's work. Palpitation of the heart was experienced occasionally. He also complained of vague pains the distribution of which was variable. There was nothing particular in the past history excepting a few attacks of dysentery. Several members of his family were also suffering from epidemic dropsy.

Examination.—The most striking feature of the case was the presence of vascular nodules on the skin. They were altogether fifty-one in number irregularly distributed over different parts of the body. They were more numerous on the trunk than on the extremities. All of them were said to have started as minute red papules, which gradually grew bigger and more vascular. Some were as big as a small marble. Most of them were sessile, and only three were pedunculated. They were rather irritable; sometimes he had scratched them, and they had bled profusely. One of the pedunculated growths was fungating and covered with sloughs which bled on manipulation. Some were noticed to be healing with formation of scabs.

Oedema was present in both legs below the knee and there was pitting on pressure. There was no tenderness on pressure or pain in the calves.

The apex of the heart was slightly displaced outwards. The first sound in the mitral area was accentuated and there was a faint systolic bruit at the base. The pulse rate was 80 per minute, systolic blood pressure 100 and diastolic 70 mm. of mercury. The electrocardiogram showed T-P interval greatly reduced showing that the heart was not getting proper rest. R-wave was splintered; this was possibly due to delay in the rate with which the impulse was propagated to the ventricles. Orthodiagram showed a well-marked enlargement of the left ventricle and right auricle. The knee jerks were normal on both sides; the pupils were equal and reacted to light and accommodation; and the field of vision and the tension were normal.

Cultures made from the stool showed numerous Gram-positive bacilli; the blood and the urine were sterile. The blood count was as follows: leucocytes—9,800, hæmoglobin—75 per cent, erythrocytes—3,820,000, polymorphonuclears—62 per cent, small mononuclears—30 per cent, large mononuclears—1 per cent, eosinophiles—7 per cent. The coagulation time of the blood was 1½ minutes. The Wassermann reaction was moderately positive. Blood calcium, uric acid and cholesterol were 12, 4 and 180 mg. respectively per 100 c.cm. of blood.

The presence of sarcoids was the chief cutaneous sign in this case. These were fifty-one in number and their distribution was irregular. They were of various types, *viz.*, sessile, pedunculated, ulcerated and fungating. Bleeding and sepsis were common complications and the healing process with scab formation was observed. There was no further formation of sarcoids when once the treatment was started.

(2) M. H., a Mohammedan male, aged 26 years, a railway ticket collector and a resident of Howrah, was admitted on the 24th September, 1934. He complained of fever, redness of the skin, palpitation and swelling of legs. He had a preliminary attack of diarrhoea about one and half months before and then these symptoms appeared, the sequence of which could not be properly ascertained from the patient. There was nothing special in his previous history. One servant and

another member of his family were attacked with epidemic dropsy a little before he got the attack.

Examination.—A generalized erythema or flush was the most striking feature of this case. It was most marked over the extremities and abdomen (*see* plate VI) and was associated with a hot burning sensation; it was purple in colour. The oedema was most marked about the middle of the legs and subsided a few days after admission. There was no sarcoid formation anywhere on the skin. He had an irregular type of fever which persisted for about two weeks after admission into the hospital. The apex of the heart was half an inch outside the normal site and there was a mitral systolic bruit. The pulse was rapid and the blood pressure 100/50 mm. of mercury. Orthodiagram showed enlargement of left ventricle and right auricle. Electrocardiogram showed shortened T-P interval. Crepitations were present at the bases of both lungs; the liver was palpable and tender; no abnormality was detected in other organs. The stools showed hookworm ova and Gram-positive bacilli on culture. The urine and blood cultures were sterile. There was excess of urobilin in the urine. The blood count was as follows: hæmoglobin—70 per cent, leucocytes—7,400, erythrocytes—3,920,000 per c.mm., polymorphonuclears—70 per cent, small mononuclears—18 per cent, large mononuclears—3 per cent, eosinophiles—9 per cent. The coagulation time of the blood was 2 minutes. Blood calcium, uric acid and cholesterol were 9, 2 and 135 mg. respectively per 100 c.cm. of blood.

This is an acute case with generalized rash and other manifestations of epidemic dropsy. The flush on the skin was a most striking feature and was purple coloured. There was no sarcoid formation in spite of the extensive erythema of the skin.

(3) B. P., a Hindu male, aged 30 years, blacksmith by occupation, was admitted on the 25th December, 1934. His complaints were (i) swelling of the legs for about one and half months, (ii) small red nodules in different parts of the body, (iii) pain in the calves, and (iv) rash on the legs. The patient used to live in a mess where there had been several cases of epidemic dropsy. On examination seven sarcoids were found scattered in different parts of the body. Most of them were of the size of a pea. One was on the toe (*vide* plate VII) in which there was an extravasation of blood which subsequently turned black and hard. There was mottling of the skin on the inner aspect of thighs; the rash on the legs was patchy in distribution. Heart:—The apex was in the normal site and there was a systolic murmur in the pulmonary area. The pulse was rather rapid; the blood pressure was 120/65 mm. of mercury. Orthodiagram showed a slight enlargement of the left ventricle and right auricle, the electrocardiogram was normal. No abnormality was detected in other systems. Hookworm and ascaris ova were found in the stool and Gram-positive bacilli were isolated from it. Microfilariae were found in the blood. Bacterial culture of the blood and urine was sterile. There was an excess of urobilin in the urine. Blood calcium, uric acid and cholesterol were 10, 4 and 135 mg. per 100 c.cm. of blood. The blood count was as follows: leucocytes—6,400, erythrocytes—3,120,000 per c.mm., hæmoglobin—65 per cent, polymorphonuclears—79 per cent, small mononuclears—17 per cent, and eosinophiles—4 per cent.

The peculiarity of this case is the simultaneous occurrence of rash and sarcoids. There was apparently hæmorrhage inside one sarcoid, which turned black, dry and hard. The rash on the legs was patchy and looked like freckles.

(4) B. B., a Hindu male, aged 35, a business man, was admitted into the hospital on 30th December, 1934, with the complaint of slight swelling of the legs, rash, especially on the legs, and pigmentation of face

PLATE VI



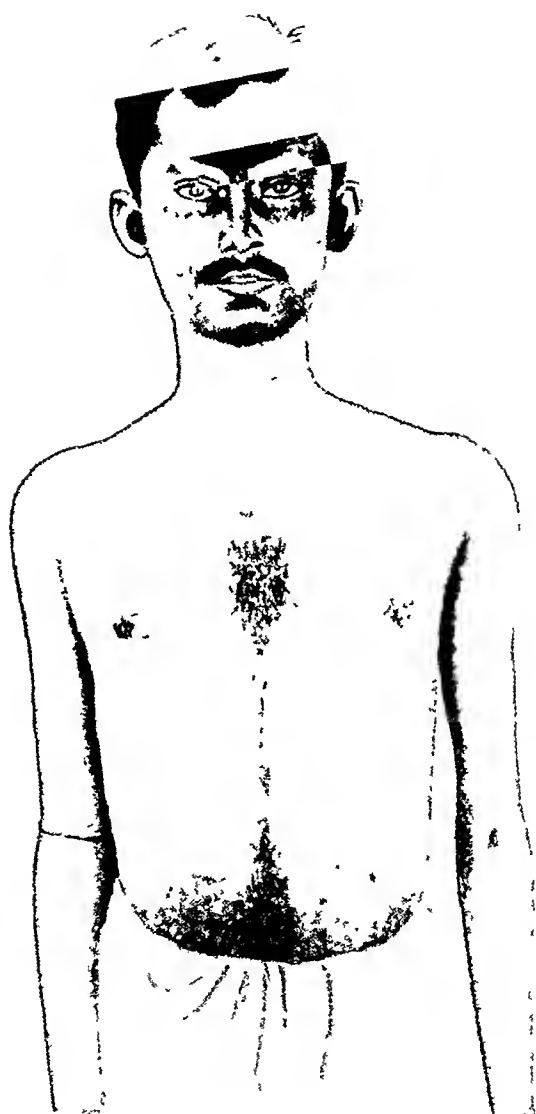
Epidemic dropsy· erythematous rash

PLATE VII



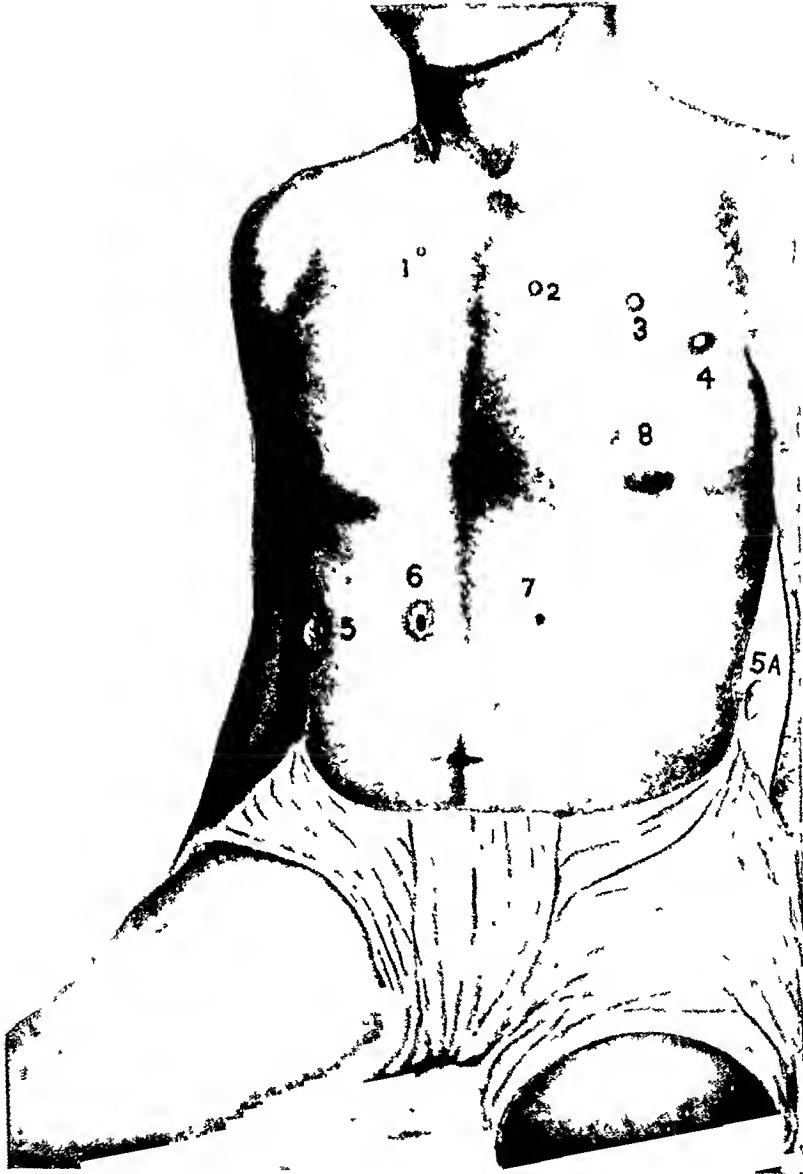
Epidemic dropsy: petechial rash and sarcoid

PLATE VIII



Epidemic dropsy: pigmentation

PLATE IX



Epidemic dropsy: composite picture of cutaneous manifestation

(vide plate VIII). The disease started a month before his admission with diarrhoea and fever which was of a low irregular type. Later, his legs became swollen and painful and subsequently a rash appeared on them. He also noticed a peculiar change in his complexion especially on his face which became much darker than normal. All the members of his family were attacked with epidemic dropsy, but his case was peculiar in that he alone had marked pigmentation on the face. A soft systolic murmur was heard in the mitral area, and the patient complained of palpitation. The liver was slightly palpable and tender. The systolic blood pressure was 120 mm. and diastolic 75 mm., hæmoglobin—75 per cent, erythrocytes—4,120,000, leucocytes—9,200 per c.mm., polymorphonuclears—83 per cent, large mononuclears—2 per cent, small mononuclears—14 per cent, and eosinophiles—1 per cent. Blood calcium, uric acid and cholesterol were 10.5 and 187 mg. respectively per 100 c.cm. of blood. Microfilariae were found in the blood. The patient complained of seeing haloes round the light at night, but the tension in the eye was normal and the fundus oculi was healthy on ophthalmoscopic examination. The knee jerks were normal and there was no calf tenderness. The patient also complained of painful defæcation. Rectal examination showed piles and anal fissures. During his treatment in the hospital the colour of his face became less dark with the improvement in his general condition.

Pigmentation and rash were the most interesting cutaneous features of this case.

Discussion

Apart from œdema, which has been dealt with in detail by the senior author in previous papers, sarcoids, rash and pigmentation are the most important skin manifestations of this disease. Sarcoids are fleshy growths, angiomatous in nature, occurring in certain epidemic dropsy cases, and were first studied and described by Acton in 1927. Their number is variable and their distribution on the body is most irregular. They are not limited to the skin, but may occur on the mucous membrane. We noticed them on the palate and gums of a patient in the out-patient department. The size of the growths is variable and they are not usually tender nor painful. When there is secondary infection they become very irritable and when scratched or injured bleed profusely. Attempts were made to study clinically the different stages through which a sarcoid may pass. Commonly it begins as a tiny red papule, which gradually increases in size. The biggest we have so far seen was about $1\frac{1}{2}$ inches in diameter; it was situated in the mammary region. After a variable period the growth begins to dry up and disappear. Scales are often formed on the surface during this process and if the scales are rubbed off the bright red sarcoid becomes visible again. This process goes on till the whole sarcoid is dried up leaving a pigmented area. Large sarcoids are prone to be pedunculated and to become infected with secondary organisms. Severe hæmorrhage is a common complication which aggravates the anæmia of the patient. Ulceration may occur following sepsis.

Plate IX is a composite illustration of the stages of sarcoids observed by us. Nodules

numbered 1, 2, 3 and 4 are growing stages. The healing stages (nos. 5, 6 and 7) are not infrequently associated with fine scale formation and some irritation. Finally, healing is completed by the shedding of the scabs which leave behind a small pigmented area (no. 8). Sometimes, instead of passing on to the healing stage a sarcoid grows bigger and becomes pedunculated. Constriction at the pedicle is liable to interfere with the blood supply and this along with secondary infection often gives rise to ulceration.

The production of a sarcoid is due to formation of new capillaries, but the reason why this proliferation occurs is not clearly known. It is possible that while the toxin of epidemic dropsy causes generalized capillary dilatations, it may also give rise to local irritation and proliferation of endothelial cells with formation of new capillaries thus giving rise to sarcoids.

Flushing of the skin has also been represented in the diagram. Finger marks on the right thigh show how the flush fades on pressure and reappears soon after the pressure is removed. It may be generalized or localized in particular regions of the body. Sometimes it occurs in small patches only. Peculiar mottling of the skin especially on the inner aspects of the thighs is very common. The production of the flush is due to widespread dilatation of the capillaries of the skin.

A new cutaneous manifestation observed during the present epidemic is the hyperpigmentation of the skin of certain parts of the body. The exposed parts, namely the face, hands, and feet, are chiefly affected. Two types of pigmentation have been observed, a generalized form, the face, the neck and the limbs turning uniformly dark and a patchy form, the pigmentation being most marked on the forehead and the cheek bones, and simulating kala-azar pigmentation.

Treatment.—Rash and pigmentation did not require any special treatment. They gradually fade as the patient improves under general treatment. Sarcoids required special attention in certain cases which were complicated with hæmorrhage or sepsis. Bleeding sometimes stopped with pressure only, but recurrence was quite common. We treated a few small bleeding sarcoids with carbon dioxide snow; there was no further oozing and the sarcoids gradually dried up. Big and pedunculated tumours were always removed under novocaine, and the wounds healed by first intention.

Summary

1. The chief features of one outbreak of epidemic dropsy often vary from those of another.

2. Four cases of epidemic dropsy with different types of cutaneous manifestations have been described.

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CUTANEOUS MANIFESTATIONS OF EPIDEMIC DROPSY

Part II

A HISTOPATHOLOGICAL STUDY

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ACTON AND CHOPRA (1927) pointed out the increased vascularity of the subcutaneous fatty tissue in cases of epidemic dropsy. Acton (1927) further studied the condition in detail and noted that there is marked dilatation of all the blood vessels of the skin in different areas. The venules of the subcutaneous fatty tissues were seen to be large and dilated, at first looking as if hæmorrhages had taken place in this area. Under the epidermis he noticed proliferation of endothelial cells around these dilated vessels. He also made a special study of the vascular nodules often occurring in these cases and concluded that they are new angiomatous growths of an innocent nature. They are acquired as the result of irritation of the intima of the vessels in the different skin layers by some 'septic' condition in the gut either due to bacteria or toxins. These are commonly called sarcoids. Acton referred to the workers Kaposi (1872), Boeck (1905), Darier and Roussy and criticized the name sarcoid as an unfortunate one for these lesions bear no relationship or resemblance to the sarcomata. Shanks and De (1931) observed extrême and widespread dilatation of the capillaries, which were seen more abundantly in the fatty tissue of the stratum subcutaneum.

The above observations prove that the essential lesion consists of widespread dilatation of the blood vessels of the skin. This vascular phenomenon is responsible for the erythema, œdema, and formation of sarcoids in epidemic dropsy cases.

During the epidemic of 1934 we saw a large number of cases characterized by these signs. We had the opportunity of obtaining biopsy material from cases treated in the Carmichael

Hospital for Tropical Diseases. Sections were prepared from the 'flushed skin' of different patients and also from sarcoids of various types and stages of development. In this paper we intend to describe briefly the histopathology of some of the more typical sections of these cutaneous manifestations.

The microscopic appearance of the tissues will be considered under five headings:—

1. *Histopathology of simple erythema with œdema (plate X, figures 1 and 2)*

The epidermis is normal. The basal layer shows a heavy deposit of melanin pigment, which is seen interspersed among the deeper cells of the rete. There is papillary and inter-papillary œdema of the corium, the majority of the papillæ appearing very wide, in some places almost flattened out. There is marked dilatation of the papillary and subpapillary blood vessels with perivascular infiltration which consists mainly of endothelial cells. The connective tissue is œdematous and blood vessels in all the levels of the skin are dilated. The sebaceous and sweat glands are quite healthy. In the subcutaneous tissue the fine blood vessels supplying the individual fat lobules are moderately dilated and show perivascular infiltration of the same nature as in the more superficial area. There is no evidence of extravasation or actual hæmorrhage in any portion of the tissue.

The general survey of the tissue under low power (magnification 10 × and 2/3 Ziess) shows isolated patches of cellular masses in the corium and also the subcutaneous tissue. These masses are distinctly perivascular in distribution and their nature is non-inflammatory, the main bulk consisting of the endothelial type of cells only.

2. *Histopathology of the early stage of a sarcoid (plate X, figures 3, 4 and 5)*

The epidermis is normal. The basal layer shows a fairly heavy deposit of melanin, some of the cells of the rete also show melanin pigment especially in the deeper layer. The corium shows œdema both papillary and sub-papillary in distribution. The subpapillary plexus of vessels are distinctly seen, there is very slight perivascular infiltration. A little deeper down in the corium areas of proliferating endothelial cells with formation of a large number of young blood vessels is seen. The intervening collagen bundles of the connective tissue appear œdematous. The limitation of this new endothelial cellular mass is not distinct and is apparently diffused to an uncertain depth in the corium. There is no fibroblastic reaction. Sweat and sebaceous glands are normal in structure. This diffuse proliferation of endothelial cells is distributed in small isolated patches in the more superficial portion of the corium; the deeper portion is unaffected.

(Continued from previous page)

3. Erythema, sarcoids and hyperpigmentation are the important cutaneous manifestations that have been discussed.

4. An attempt was made to study the stages of sarcoids.

5. Pigmentation is a new feature which requires further investigation.

6. Treatment has been described.

PLATE X



Fig. 1

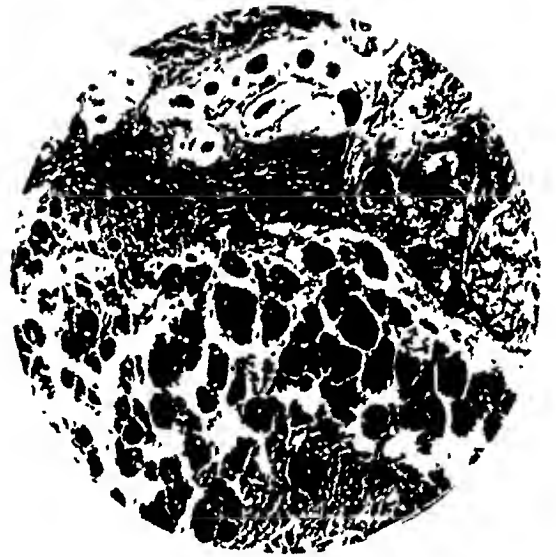


Fig 2



Fig. 3



Fig. 4



Fig. 5

3. *Histopathology of the nodular type (plate XI, figures 6 and 7)*

In the region of the sarcoid the horny layer of the epidermis is markedly thinned out and the papillæ are flattened. There is considerable œdema of the papillary and subpapillary portions of the corium; the collagen bundles look myxomatous owing to the separation of the fibres by œdema. There is marked proliferation of the endothelial type of cells with no inflammatory cellular exudate. The subpapillary and cuticular plexuses are dilated and show perivascular infiltration. This change is seen extending deep into the corium as far as the level of the sweat glands. Sebaceous and sweat glands are absent in the region of the main tumour mass. Diffuse patches of endothelial cellular proliferation and formation of new vascular twigs are noticed at different levels in the corium. At the junction of the unaffected area with this new sarcoid formation the horny layer is thickened, there is enormous hypertrophy of the rete which is seen as finger-like projections extending deep into the corium almost to the level of the sweat glands. This hypertrophy of the epidermis (plate XI, figure 6) seems to be nature's way of limiting the process. A fully-formed sarcoid at this stage (plate XI, figure 7) contains newly-formed blood vessels of different sizes and a few connective tissue cells but no fibroblasts nor any inflammatory cellular exudate.

4. *Histopathology of the fungating or ulcerative type (plate XI, figures 8 and 9)*

In the epidermis the prickle-cell layer is markedly œdematous; the nuclei are indistinct in the more superficial portion. In some places the upper portion of the rete is separated from the horny layer by formation of a large vesicle containing a few polymorphonuclear leucocytes. In other places the superficial part of the rete shows degenerative changes with infiltration of round cells and polymorphonuclear leucocytes leading on to ulcerative changes in the epidermis. Throughout the affected area the cells of the rete are seen to undergo degenerative changes by the formation of large vacuolated spaces with polymorphonuclear infiltration in the immediate vicinity. Apparently there is a good deal of leucorrhæxis and a certain amount of erythorrhæxis without any actual hæmorrhage. (In one portion of the affected area actual extravasation and hæmorrhage were seen which may have been due to some injury of blood vessels by external agents.) The basal cells are devoid of pigment. The subpapillary vessels are engorged and a few of them show thrombi. The corium is œdematous; the collagen bundles are separated from each other giving it a myxomatous appearance. The deeper portions are hæmorrhagic. There is also formation of a network of young blood vessels. The hilum of the tumour mass is also hæmorrhagic and the

connective tissue elements are markedly œdematous. The fibrils running from the deeper portion towards the surface are accompanied by twigs of newly-formed blood vessels which are also engorged.

These pedunculated sarcoids very often undergo ulcerative changes. Trivial injuries cause rupture of the œdematous and degenerated epidermis and allow free flow of the extravasated blood—hence the name 'bleeding vascular mole'.

5. *Histopathology of healing sarcoid (plate XI, figures 10 and 11)*

The epidermis is represented by only one or two layers of flattened cells of the rete, the deepest ones containing a little pigment. The superficial horny epithelium is seen to undergo thickening and is detached from the subjacent layer. The papillæ are flattened out and there is a marked œdematous condition of the corium. The subpapillary vessels are markedly enlarged and those in transection are seen packed with red blood corpuscles. A large number of ramifying newly-formed blood vessels, the walls of which consist of a single layer of endothelial cells, are seen distributed throughout varying depths of the corium. There is no evidence of perivascular infiltration around these newly-formed blood vessels and there is no evidence of inflammatory cellular exudate in any portion of the sarcoid. In the younger portion changes in the epidermis, similar to those already mentioned, are noticed. In one area there is extravasation and actual hæmorrhage in the subcuticular region where the colloidal degenerative changes have already commenced. The fibres of connective tissue near the hilum are seen running parallel with the newly-formed twigs of blood vessels. The connective tissue is also seen undergoing patchy colloidal degeneration in this region. There is no evidence of fibrotic changes in the region of the pedicle. A

DESCRIPTION OF PLATE X

Figures 1 and 2.

Erythema with œdema.

Figure 1.—Normal epidermis, the basal layer being packed with melanin pigment. Patchy dilatation of subpapillary blood vessels with slight perivascular infiltration. The dilated vessels are packed with red blood cells. Slight papillary and subpapillary œdema.* (Magnification 10 × and 2/3.)

Figures 3, 4 and 5.

Early sarcoid.

The papillæ are partly flattened. Basal layer rich in pigment (figure 4). Œdema of papillary and subpapillary portion of corium (figures 3, 4 and 5). Marked proliferation of endothelial cells and formation of a large number of young blood vessels well marked in figures 4 and 5 with a single endothelial lining. Œdematous collagen bundles. (Magnification 10 × and 2/3.)

* Blood vessels supplying the fat lobules are dilated (figure 2).

considerable number of the finer twigs of newly-formed blood vessels are seen to be undergoing thrombosis. This histopathological picture is suggestive that the new formation is of non-infective origin.

Discussion.—This study shows that the vessels of the skin are first dilated; then there is an endothelial proliferation, which may finally lead to formation of new blood vessels. Increased vascularity is chiefly responsible for the production of the swelling and erythema. As a rule the erythematous rash is more pronounced when the superficial vessels are involved in the change. In some sections of the 'flushed skin', the capillaries were seen dilated in all the layers of the corium, and the venules in the subcutaneous tissue were comparatively less dilated. The corium is sometimes very much thickened with all its vessels dilated and engorged with blood. Endothelial proliferation is particularly noticed in early sarcoid formation and, when this proliferation goes on for some time, new blood vessels are formed with multiple blood sinuses giving the appearance of an angioma.

We made an attempt to find out whether the skin lesions, especially the sarcoids, are of infective origin. No growth was obtained in cultures. Inoculation into monkeys was not followed by any reaction or symptoms. Two of us inoculated ourselves with an emulsion of sarcoids, but the results were negative. These results rule out the possibility of direct contagion.

Our thanks are due to Dr. K. P. Banerjee, M.B., D.T.M., Assistant Professor of Pathology, Calcutta School of Tropical Medicine, for his help in studying the histological changes.

Summary

The histopathology of various cutaneous lesions has been described.

(Continued at foot of next column)

DESCRIPTION OF PLATE XI

Figures 6 and 7.
Nodular sarcoid.

Thin horny layer, flattening of papillæ, papillary and subpapillary œdema (figure 7). Marked endothelial proliferation as also marked dilatation of subpapillary and cuticular vessels (angioblastic tissue) with walls being lined with a single layer of endothelium. (Magnification 10 × and 2/3.)

Figures 8 and 9.
Fungating sarcoid.

œdematous prickly cell layer and infiltration of round cells and polymorphonuclear leucocytes in the epidermis. Leucorrhæxis and erythorrhæxis (figure 8). Dilated vessels showing thrombi (figure 8). Formation of vesicles (figure 9). (Magnification 10 × and 2/3.)

Figures 10 and 11.
Healing sarcoid.

Thin epidermis. Thickened horny layer with vesicle formation and hæmorrhagic exudation. Colloidal degeneration with hæmorrhage (figure 11). Thrombosis of some of the new blood vessels. (Magnification 10 × and 2/3.)

OBSERVATIONS ON EPIDEMIC DROPSY CASES ADMITTED INTO THE TROPICAL DISEASES HOSPITAL FROM 1922 TO 1933

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LIEUTENANT-COLONEL, I.M.S.

and

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In the present paper, we have attempted an analysis of the cases of epidemic dropsy admitted into the Carmichael Hospital for Tropical Diseases from the time of its opening in 1922 to the end of the year 1933. During this period a total of 131 cases of the disease were admitted; of these the largest number, *i.e.*, 39, was admitted in the severe epidemic year of 1926. In 1932 when the epidemic was also fairly severe 23 cases were admitted and treated. In between these two epidemic years, we had a slight rush of patients in 1929, when the admission curve (*vide* annual curve) rose above the average. In other years, the admissions were below the average except in 1924 when the curve just touched it with 11 admissions. The period under review is too short to draw any conclusion regarding the periodicity of the epidemics, but certain points in the curve are striking. The curve consists of a series of sharp peaks and deep valleys; there is no high plateau anywhere in the curve. This shows that a severe epidemic in a year was usually followed by a period of quiescence.

Seasonal incidence.—A grouping of the cases month by month shows some interesting features.

Here a short statement regarding the seasonal variations of this province will not be out of place. Between the months of November and February Bengal has very little rainfall while the prevalent wind is the dry and cold north-western monsoon. During the months of March, April, May and the first two weeks of June, the province is visited by heavy thunderstorms; the prevalent wind during this period is the hot and comparatively humid south-eastern monsoon. The rainy

(Continued from previous column)

The chief changes consist in dilatation of blood vessels in all the layers of the skin, proliferation of endothelial cells around the dilated vessels, and sometimes formation of new capillaries which give rise to sarcoids.

The lesions are not infective.

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PLATE XI



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10

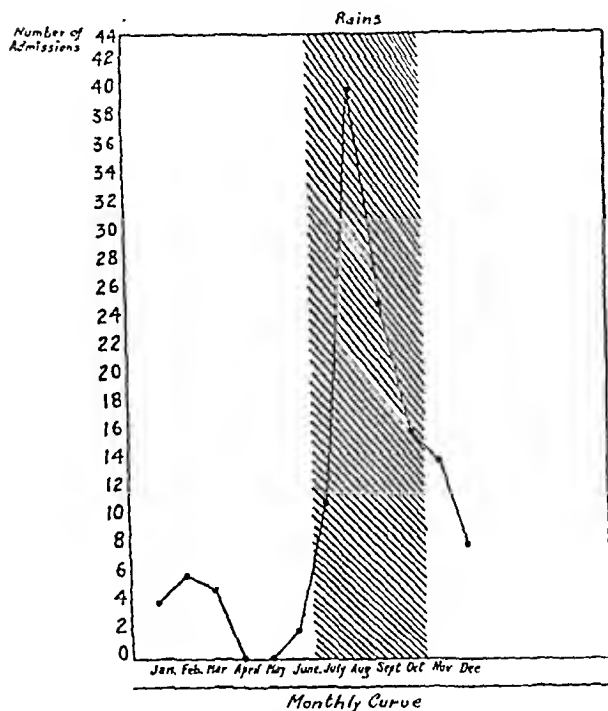


Fig. 11

season starts by the middle of June and extends to the middle of October, though the heaviest fall occurs between June and September.

A study of the monthly admission curve shows a sharp rise from June to the maximum in August. Then it falls nearly as rapidly to October and more gently through the cold weather months to zero in April. The shaded portion of the figure indicates the rainy season of the year. It is quite apparent that the epidemics were most prevalent during the rains and immediately after it. During the cold dry months, a few patients were admitted but these were the remnants from the preceding epidemic. There were no admissions during the two months immediately following the dry, cold season, i.e., April and May, and only two admissions in the month of June. These observations extending

GRAPH I



over a period of twelve consecutive years show a distinct relationship between the occurrence of an epidemic and the rainy season.

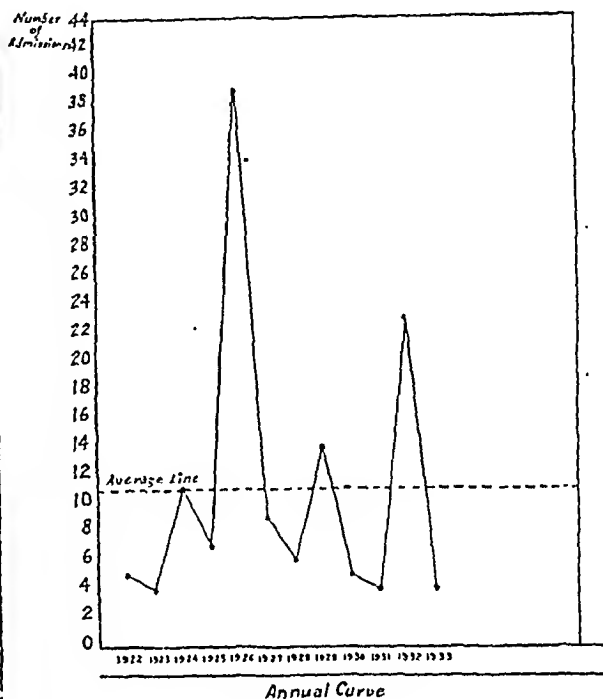
Age incidence.—Epidemic dropsy is a disease affecting the people at the prime of life. Out of 131 cases of this series, 16 were in the first decade, 39 in the second, 42 in the third, 22 in the fourth, 8 in the fifth, 3 in the sixth, none in the seventh, and a solitary case in the eighth decade. The lowest age observed in our hospital was in a patient two years old.

Sex.—It is not possible to give any opinion about the sex incidence of the disease from our figures, as the ratio is influenced by the ratio of available male and female beds of the hospital, and the number of the latter is comparatively much smaller. But our general experience of the disease goes to show that males and females in a family are equally attacked by the disease.

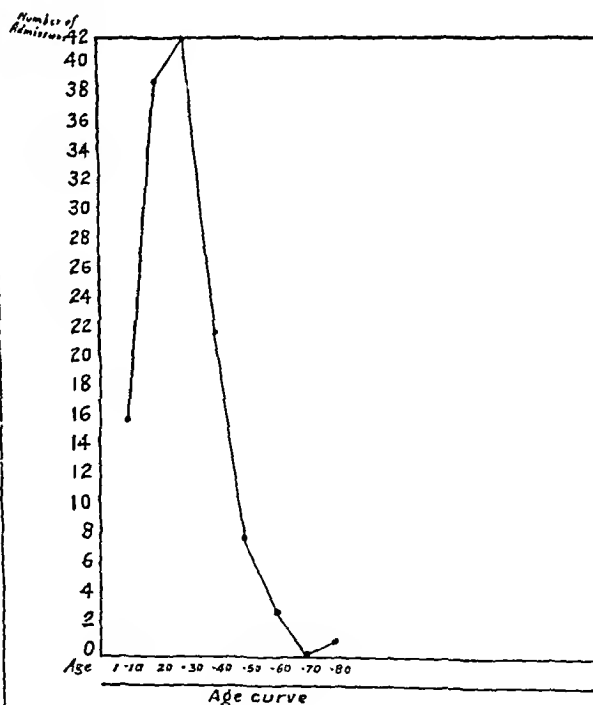
Race.—Epidemic dropsy is a disease of rice-eating people. In our series there were 94 Bengalis, 21 Anglo-Indians and Europeans (all

rice and curry eaters), 8 from Bihar and the United Provinces, who while in Bengal take at least one meal of rice during the day, 2 Jews

GRAPH II



GRAPH III



and 2 Nepalis, 1 Oriya, 2 Chinese and 1 Assamese.

When classified according to their religion, there were 64 Hindus, 43 Christians, 20 Mohammedans and 4 of other castes. Our series

showed a proportionately large number of Bengali Christians admitted for this disease.

Symptoms.—The patients admitted showed a variety of symptoms during the onset. The commonest of these were œdema (66), diarrhœa (41) and fever (25); many of the patients showed a combination of the above symptoms. Eleven patients started the disease with heart symptoms; of these six complained of palpitation, four of dyspnœa and one of cardiac pain. One patient complained of vague pains in the abdomen at the outset, another had a red rash on the lower limbs and two had severe pains in the legs.

The main symptoms manifested by the patients are grouped under the following heads: (1) œdema, (2) diarrhœa, (3) fever, (4) cardiac symptoms, (5) nervous symptoms, (6) cutaneous symptoms, and (7) eye symptoms.

œdema.—This was the commonest manifestation of the disease in this series and, out of the total of 131 cases, 125 suffered from œdema some time or other during the course of their illness. The commonest sites were the lower extremities, but very often the hands and the trunk were also affected. The œdema was usually of solid type especially in the early stages. Tenderness and redness of the affected parts were common features.

Diarrhœa.—Eighteen patients suffered from diarrhœa at the onset only and 47 cases suffered from it off and on during the course of the illness. Only 13 patients had constipation. The incidence of diarrhœa was more common during the severe epidemic years when more acute cases were admitted into the hospital. For instance, 65 per cent of patients had diarrhœa in 1927, 70 per cent in 1929 and 56 per cent in 1932, while the average percentage of diarrhœa in non-epidemic years was 27 per cent only.

Fever.—Out of 131 patients in this series, 94 had some rise of temperature during the course of the disease, while 37 were absolutely afebrile. Out of these 94 cases, 9 had short periods of fever during the onset only, but the majority (60 in this series) ran a low irregularly-intermittent temperature during the progress of the illness; the temperature settled down with the amelioration of other symptoms. In 12 patients the temperature instead of being intermittent was of a low remittent type. One patient had a high remittent fever for a short period due to an intercurrent attack of influenza. Three patients in 1932 had a high irregular temperature, and in two of these malarial parasites were found in the blood. In seven cases the temperature curves showed an occasional high rise and of these four proved to be due to malarial infection. One severe case in 1926 ran an up-and-down temperature of a septic type. As in case of diarrhœa the percentage of patients suffering from fever also increased during the epidemic years, being 66 per cent, 92 per cent and 95 per cent in 1926,

1929 and 1932, respectively. The average percentage of fever in non-epidemic years was 38.

Cardiac symptoms.—An analysis of the cardiac manifestations showed multifarious symptoms. For convenience the patients were classified into four broad groups, (1) those with grave symptoms, (2) those with moderately severe symptoms, (3) those with slight symptoms, and (4) those in which no cardiac symptoms were present. Those patients who showed intense venous engorgement, dilated heart, embryonic rhythm, orthopnœa and similar symptoms of acute cardiac failure were classified as grave; those classified as moderate had such symptoms as dyspnœa on slight exertion, palpitation, systolic hrûit, moderate dilatation of the heart and other signs of partial failure. Those classed as slight only complained of occasional palpitation, without any detectable organic defect; a few patients had no cardiac trouble at all. In this series there were 13 patients with no cardiac symptoms, 19 cases with slight, 66 with moderate, and 33 with marked evidence of cardiac insufficiency.

As has been observed in two previous papers (Chopra and Basu, 1930, and Chopra and Bose, 1933) the chief cardiovascular symptoms of this disease are anæmia and tachycardia which are fairly constantly present, their degree varying with the severity of the disease.

Nervous symptoms. *Knee jerks.*—In 59 patients there was no alteration in the knee jerks; in two they were diminished; in 17 they were lost. Both knee jerks were increased in 39 patients, while in 14 patients they were manifestly unequal.

Other nervous manifestations were pain and tenderness in the limbs and these were present in 47 patients in this series. Only in three cases weakness and numbness of the lower extremities were complained of.

Cutaneous symptoms.—General flushing of the skin and a petechial rash of the affected limbs and often over the trunk were the commonest skin conditions met with, and in this series there were 26 of the former and 13 of the latter. Another interesting skin manifestation was the appearance of tiny scarlet nœvoid growths, 'sarcoids'. Six patients of this series showed these growths in their bodies. The cutaneous symptoms were comparatively more prominent in the epidemics of 1926 and 1932 and during both these years 48 per cent of the patients showed these lesions.

Eye symptoms.—In some epidemics series of ophthalmoscopic examinations were carried out. Seven patients showed cupping of the disc, three patients had retinal hæmorrhage and one engorgement of the retinal veins. In two patients the only ocular symptom was an increased tension.

Laboratory examinations.—Routine examinations of the stools and the blood of the patients were carried out for any concurrent pathological

condition. Hookworm ova were found in 28 cases, while 6 cases showed ascaris infection. Only one case had *E. histolytica* in the stools; 8 patients had malarial parasites in the blood; and 7 had microfilariæ.

Treatment.—A rice-free diet and rest in bed were the two important factors in the treatment in this series. Rice in any form was withheld from the patients and a diet rich in proteins was given throughout the illness and well into the convalescent period. Perfect rest in bed was insisted upon to give the heart as much rest as possible. Twenty-two patients in this series were treated only with rest and rice-free diet with quite satisfactory results.

A large number of drugs were tried. Digitalis was tried in 25 cases, strophanthus in 7, caffeine in 4. Calcium was given intravenously in 9 cases, and by the mouth in 12 with extract of parathyroid. Iron alone was given in 13 cases, iron with strychnine in 49 and with arsenic in 6. Adrenalin alone or with pituitrin was administered in 31 patients and lately tincture of ephedra was given by mouth in 28 cases with a view to controlling cardio-capillary crises.

With regard to details of the comparative usefulness of these drugs, the reader's attention is drawn to the previous paper (Chopra and Bose, 1933).

The digitalis group of drugs was of little value in relieving cardiac symptoms of epidemic dropsy. Capillary constrictors, such as adrenalin or ephedra, preferably combined with a nerve tonic, such as strychnine and a hæmatinic, such as iron, gave the best results. In acute cases with intense venous engorgement blood-letting was tried to relieve the cardiovascular system. This procedure often helped the patient to get over a crisis and thus saved several lives.

Results.—In this series of 131 cases there were 9 deaths; 75 patients were discharged as cured, 35 as relieved, and 14 were discharged without marked improvement.

Summary and conclusions

Epidemics of this disease do not recur year after year; the disease is at its worst during the rains. It generally affects both sexes at the prime of life, and, so far as our observations go, only rice-eating races are affected. In this series, although the number of Mohammedan patients is much less than that of Hindus and Christians, the proportion of Mohammedans to the other two religious groups is the same amongst epidemic dropsy cases as amongst the whole hospital population. The Mohammedans, however, form 55 per cent of the total population of the province, but the bulk of them are cultivators and field labourers. It would appear that the disease is pre-eminently one of the middle-class people.

Œdema, diarrhoea and fever are the commonest symptoms at the onset; the cardiac and

other symptoms are nearly always later complications.

As the name of the disease implies, œdema is almost a constant feature. Fever and bowel complications are frequent symptoms of the disease, particularly during severe epidemics. The heart is nearly always affected with more or less severity. The knee jerks are variable, but an increase in the jerks is the commonest variation. Neuritic pains and tenderness of the affected limbs are important nervous manifestations; the eye symptoms are variable and in certain epidemics a large number of patients suffered from glaucoma while in others there were less. Flushing of the affected limbs and in certain cases a hæmorrhagic rash may be encountered. Sarcoids are an interesting skin phenomenon of the disease.

The most important factors in treatment are (1) rice-free diet, and (2) rest in bed. The digitalis group of drugs is of little value in the cardiac failure of epidemic dropsy. Adrenalin and pituitrin injections give temporary benefit and are useful in averting cardio-capillary crises. Tincture of ephedra vulgaris introduced by the senior author combined with calcium lactate has lately proved efficacious. In our series the death rate was 6.87 per cent.

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THE INCIDENCE OF CEREBRO-SPINAL FEVER IN THE BORSTAL INSTITUTION AND CENTRAL JAIL, LAHORE, DURING 1934, WITH A NOTE ON THE USE OF ANTI-MENINGOCOCCUS PROPHYLACTIC VACCINE

By M. YACOB, M.B., B.S., DR. P.H., D.P.H., D.T.M. & H.
Epidemiologist to Government, Punjab

THE work in connection with the suppression of cerebro-spinal fever in the Lahore jails was continued during the year 1934.

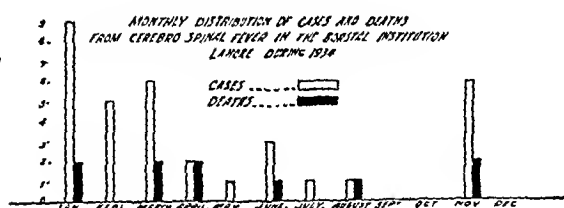
The total number of post-nasal swabs examined during the year was as follows:—

	Number of swabs	Number of carriers detected	Percentage carrier rates
Borstal Institution, Lahore.	3,950	19	1
Central Jail, Lahore.	2,652	21	1.5
TOTAL ..	6,602	40	

The procedure adopted consisted of swabbing all the new entrants who were not allowed to mix with the general jail population until they had been declared negative. In addition, swabs of contacts were also examined as soon as any case occurred. The prisoners who were under transfer to the Andamans and other jails were also swabbed and not allowed to leave till they had been declared non-carriers.

The Borstal Institution, Lahore

Cases of cerebro-spinal fever continued to occur in the Borstal Institution during the year 1934. In all 34 cases with 10 deaths were reported. The distribution of these by months is shown in the chart below.



It will be seen that the largest number of cases occurred during the months of January, February, March and November, namely, 9, 5, 6 and 6, respectively.

The Central Jail, Lahore

During the year 6 cases and 4 deaths occurred from cerebro-spinal fever in the Central Jail, Lahore, one each in January and February, three in March, and one in August. This last patient had been released temporarily on 2nd August, but was admitted nine days later as a fulminating case of cerebro-spinal fever.

Preventive measures

The general scheme of prophylaxis consisted in keeping in quarantine all fresh admissions

to the jails until their post-nasal swabs had been examined and found negative for the meningococcus, isolation of the sick and of carriers, segregation of contacts, adoption of general measures for the avoidance of overcrowding and the use of 1 in 5,000 solution of potassium permanganate in normal saline for gargling and for sniffing up the nose.

In addition, the prophylactic inoculation of prisoners with anti-meningococcus vaccine was also carried out. A quantity of vaccine, prepared at the Central Research Institute, Kasauli, was obtained through the courtesy of Lieutenant-Colonel J. Taylor, D.S.O., I.M.S., the Director of the Institute, for the purpose of conducting a controlled experiment amongst the prisoners of Lahore jails to ascertain the immunizing value of the vaccine. With this object the population of both the jails—the Borstal Institution and the Central Jail—was divided into approximately two equal portions. One portion was inoculated with the vaccine, whilst the other was left as a control. Both portions were otherwise kept under identical conditions as regards work, sleep and general environment, etc.

The vaccine was administered at weekly intervals in three divided doses of 0.5 c.cm., 1 c.cm. and 2 c.cm. to each prisoner. Altogether 1,769 individuals were inoculated, 1,002 in the Central Jail and 766 in the Borstal Institution; of the latter group 46 received only two and 55 only one injection.

Up to date (April 1935) 6 cases of cerebro-spinal fever have been reported in the Borstal Institution amongst the non-inoculated group and none from the inoculated group. In the case of the Central Jail, however, one fulminant case of cerebro-spinal fever which proved rapidly fatal was reported from the inoculated group in addition to an imported case from Lahore district.

Reactions following inoculations.—There was some constitutional disturbance consisting of headache and a rise of temperature varying between 99.5°F. and 100.5°F. in about 60 per cent of the prisoners after the first inoculation. A few prisoners also complained of pains in the joints. The reaction progressively decreased in severity with the second and third inoculations.

The reactions, both general and local, were in no case so severe as to incapacitate a person from doing his work for more than a day.

Immunizing value of the vaccine.—The number of cases of cerebro-spinal fever that have so far been reported from both the jails are all amongst the non-inoculated with the exception of the one fatal case reported from the inoculated group in the Central Jail, Lahore. The number of cases, however, is so small that no significance can be attached to the result and it is not possible to express an opinion as to the

(Continued at foot of opposite page)

A SHORT ACCOUNT OF TEN CASES OF ECLAMPSIA TREATED BY INTRA-VEINUS INJECTIONS OF MAGNESIUM SULPHATE

By M. M. NOLAN, M.Ch., M.A.O., F.R.C.S.I.,
M.C.O.G., W.M.S.

Ishwaria Memorial Hospital, Benares

DURING the past winter in Benares the weather was very cold, especially during the lunar eclipse and all the cases of eclampsia admitted to the Ishwaria Memorial Hospital were of a severe type. In December there were three cases treated by the routine morphine and chloroform method; these were all fatal. In January I resolved to try one of the newer methods of treatment for this disease.

Ten cases of eclampsia have been admitted up to date this year; nine were discharged in good health; one fatal case had repeated injections, presumably of morphine, before coming to hospital. The cases which received only magnesium sulphate with occasionally some chloral hydrate and potassium bromide in saline were all remarkably free from lung complications, and in spite of inadequate nursing attention did well. Rectal medication was given up in the later cases, because it was found that owing to restlessness patients did not retain the rectal catheters, and there were not enough nurses to allow of constant attention. As a rule patients were given castor oil or black draught as soon as they were able to swallow, and then also large doses of alkalies were given four hourly. Consciousness was usually complete on the third day post partum, and headache was complained of for a few days after this. No pituitrin was used in any stage of the labour. All the cases had been vaginally examined before admission and all had a febrile puerperium and for this reason many had to be kept a long time in hospital. The progress of

(Continued from previous page)

immunizing value of the anti-meningococcus prophylactic vaccine at this stage.

[Note.—A paper reporting the incidence of 27 cases of cerebro-spinal fever in the Borstal Institute during 1932-33 was published in our May number this year. There was little evidence then that the disease was being imported from outside, the carrier rate amongst new entrants being only 0.65 per cent. In 1934 the total carrier rate was only 1 per cent, but it is important to know what was the rate amongst new entrants only. If it was no higher than it was in 1932, we suggest that the main source of infection is within the institution.

The results obtained with the prophylactic vaccine, though not conclusive evidence, suggest that this measure may be successful in checking the epidemic; otherwise, the position appears to be serious enough to warrant more energetic measures. The searching for carriers amongst so-called 'contacts' only is not likely to effect much in the way of checking an air-borne epidemic.—EDITOR, I. M. G.]

labour was investigated only by rectal examinations after admission. The preparation of magnesium sulphate used was that prepared by the Bengal Chemical Company.

My house surgeons, Mrs. Mahadavan and Miss Deshpande, deserve my gratitude for their help and the interest they took in these cases.

Case 1.—Mohammedan, aged about 18 years, primipara, was admitted on 5th January, 1935, at 5-30 p.m. with a history of having had numerous fits since 10 a.m.

Findings.—Is in labour. Blood pressure—systolic 150 mm.; urine—albumin + + +.

At 6-30 p.m. an intravenous injection of 20 c.cm. of a 25 per cent solution of magnesium sulphate was given; as fits continued, the injection was repeated at 7-30 p.m. and from 8-30 p.m. a 2 c.cm. injection of the 25 per cent solution was given intramuscularly every hour up to midnight when fits ceased.

6th January at 8 a.m.—The membranes were ruptured artificially. During the day there were no fits, patient was deeply unconscious.

At 5-30 p.m. pulse was feeble and rapid so an intravenous injection of strophanthin, grain 1/100, was given.

7th January at 7 a.m.—A dead full-term foetus was delivered naturally, the placenta followed in 5 minutes, there was no post-partum hæmorrhage. The patient remained semi-conscious for 4 days.

1st February.—The urine was free from albumin for the first time since admission.

She was discharged on the 25th day post partum, her general condition being good.

Case 2.—Hindu, aged about 22 years, third para, was admitted on 15th January, 1935, at 5 p.m. in a state of deep unconsciousness, with a history of repeated fits since 11 a.m.

Blood pressure—systolic 170 mm.; temperature—100°F.; pulse—120; respirations—30; urine—reaction acid; albumin + + +.

At 5-15 p.m. an intravenous injection of 10 c.cm. of 50 per cent solution of magnesium sulphate was given, and repeated at 6-15 p.m. After the second injection there were no more fits.

At 8-15 p.m. a dead foetus was born naturally; placenta followed in 5 minutes; there was a slight post-partum hæmorrhage.

17th January.—The patient was completely conscious for the first time.

27th January.—There was only a trace of albumin in the urine.

2nd February.—The patient was discharged well.

Case 3.—Hindu, primipara, aged 19 years, was admitted on 18th January, 1935, at 10 a.m. with a history of 8 fits since 4 a.m. The patient was screaming on admission and had a fit as soon as she was put on the examination table.

At 10-30 a.m. a 12 c.cm. intravenous injection of a 25 per cent magnesium sulphate solution was given, and repeated at 11-30 a.m. after which there were no more fits.

20th January.—A stillborn foetus of seven months was delivered by breech.

6th February.—No albumin was present in the urine and the patient was discharged in good condition.

Case 4.—A primipara was admitted on 18th January, 1935, at 5 p.m. with a history of repeated fits from 7 p.m. the evening before.

Deeply unconscious.

Urine—albumin + + +.

She had a fit on admission; immediately on admission an intravenous injection of 10 c.cm. of 25 per cent solution of magnesium sulphate was given.

At 9 p.m. a stillborn foetus was delivered naturally.

19th January.—Fits recurred at 6 a.m. A 10 c.cm. intravenous injection of a 25 per cent solution of magnesium sulphate was given, after which there were no more fits.

27th January.—No albumin was present in urine.

21st March.—The patient was discharged well.

Case 5.—A primipara, aged 18 years, was admitted on 18th January, 1935, at 6 p.m. with a history of albumin in the urine and œdema of face and feet for some days; she had two fits before coming to hospital. Fits recurred on the examination table.

Urine—albumin + + +.

She was found to be in labour with foetal head un-fixed and pelvic measurements generally small. Cæsarean section was advised but relatives refused permission.

Ten cubic centimetres of 50 per cent solution of magnesium sulphate was given intravenously. There were no more fits.

19th January.—With high Kjilland forceps a live child was delivered which lived only 6 hours.

Patient's urine contained albumin till mid-February. She developed a pyelitis which cleared up after repeated injections of urotropin.

11th March.—She was discharged in fair condition but with a high degree of anæmia.

Case 6.—Hindu, aged 30 years, primipara, was admitted on 23rd January, 1935, at 12-30 p.m. with a history of numerous fits at home.

Urine—albumin + + + +.

An 8 c.cm. intravenous injection of 25 per cent solution of magnesium sulphate was given at 12-40 p.m. and repeated two hourly for 5 doses as patient had numerous fits.

Normal saline per rectum with 30 grains each of chloral hydrate and potassium hydrate to the point was given by the drip method. Digitalin grain 1/100 was given hypodermically every 4 hours for 48 hours.

24th January.—By midday the patient was having strong labour pains and was unconscious. External conjugate was 6 inches, foetal head did not fix. At 5 p.m. lower segment Cæsarean section was done and a living male child was delivered. The baby lived one month.

11th February.—Urine was free from albumin. The patient developed post-operative pneumonia, then a stitch abscess, and later had very bad diarrhoea for several days.

11th March.—She was discharged fit.

Case 7.—Hindu, aged 22 years, primipara, was admitted on 30th January, 1935, at 3 p.m. with a history of repeated fits since 3 a.m. and said to be in labour for 3 days.

Eight cubic centimetres of 25 per cent solution magnesium sulphate was given intravenously on admission.

The head was found to be on the perineum and a stillborn male foetus was delivered by low forceps. There was very free post-partum hæmorrhage which was controlled by hot saline intra-uterine douches and hypodermic injection of ergotinine citrate, grain 1/100, after expression of the placenta. Rectal drip of normal saline with potassium bromide and chloral hydrate of each grains 30 to the pint was given on return to the wards.

1st February.—The patient was conscious and had had no more fits since delivery.

4th February.—Systolic blood pressure was 100 mm.; the patient had had a secondary hæmorrhage which appeared to come from a cervical laceration; it was controlled by packing with glycerine gauze.

1st March.—Urine—free from albumin and the patient was discharged in good condition.

Case 8.—Mohammedan, aged 16, primipara, was admitted on 31st January, 1935, at 10 a.m. with a history of fits since 7 a.m. and in labour for 24 hours.

Urine—albumin + + + +.

Ten cubic centimetres of 50 per cent solution of magnesium sulphate was given intravenously at 10-30 a.m. and repeated at 12-30 p.m., 4-30 p.m. and 7 p.m. because of numerous fits during day.

Baby born naturally at 5-30 p.m.; living male—weight 9 pounds.

7th March.—Urine free from albumin.

(Continued at foot of next column).

ON THE ESTIMATION OF MINUTE QUANTITIES OF ATEBRIN IN THE BLOOD

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LIEUTENANT-COLONEL, I.M.S.

and

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In a previous paper Chopra, Ganguli and Roy (1935) have shown that in monkey malaria there is no direct relationship between the concentration of quinine in the blood and the parasite count at any particular time. The highest concentration of the alkaloid attainable without producing marked toxic effects produces neither apparent reduction in the number of parasites nor degenerative changes in them. On the other hand, in the majority of cases there is a definite apparent increase in the number of parasites per c.mm. of blood after administration of quinine. The action of quinine on these parasites according to these workers does not appear to be direct, but probably synergistic to other mechanisms set up in the body.

We thought it would be of value to study the action of atebrian on similar lines and to make a comparative study of the action of these two drugs in this respect. The chief difficulty encountered was that there is no recognized method for the estimation of atebrian in the blood. We

(Continued from previous column)

17th March.—Discharged in good health—baby weighed only 5½ pounds on discharge.

Case 9.—Hindu, aged 17 years, primipara, was admitted on 13th March, 1935, at 4 a.m. with a history of fits for 2 hours, and in labour for 12 hours; an injection of morphine—strength not stated—given outside.

Urine—albumin + + + +.

At 4-30 a.m. 20 c.cm. of 25 per cent solution of magnesium sulphate was given intravenously.

At 5-20 a.m. a living male child delivered naturally. Fits recurred immediately after delivery so a further 10 c.cm. of a 50 per cent solution of magnesium sulphate was given intravenously.

14th March.—Fits began again at 6-15 a.m. Five intravenous injections each 10 c.cm. of 50 per cent solution of magnesium sulphate given during the day at two-hourly intervals to check the fits. Last injection was at 3-30 p.m. after which there were no more fits.

14th April.—The patient was discharged. Urine was free from albumin. The baby's condition was poor as the mother did not look after it properly.

Case 10.—Mohammedan, aged 17 years, primipara, was admitted on 6th April, 1935, at 6 p.m. with a history of fits since 7 a.m., and having had injections of morphine outside.

She had a fit on admission and was very restless. Temperature—101.8°F.; pulse—128; respirations—40 per minute.

Eight cubic centimetres of 50 per cent solution of magnesium sulphate was given intravenously, after which there were no more fits.

7th April.—Patient deeply unconscious; foetal heart sounds not present, foetal head low in pelvis so cranioclast was applied without chloroform and foetus slowly extracted. The patient never regained consciousness.

9th April.—Patient died, apparently of pulmonary œdema.

had therefore to evolve a suitable method for this purpose. As atebtrin is a base, which is easily soluble in ether and which behaves in most respects like an alkaloid, we thought that the method which was employed for quinine estimation might be applicable to the estimation of atebtrin also.

As a result of some preliminary experiments regarding the solubility of the atebtrin base and its salts, it was observed that atebtrin was not soluble in acidified zinc sulphate solution nor in saturated ammonium sulphate solution as is the case with quinine, but the base is extremely soluble in amyl alcohol. When the extracted atebtrin is dissolved in dilute acids alone, the gradation of colour developed after the addition of Roy's reagent (1926), or potassium bismuth iodide reagent as recommended by Vedder and Masen (1931), is not sharp enough for delicate comparisons. It was also observed that the extraction of atebtrin with ether is more complete when the filter paper strips in which the blood has been soaked are dried in an electric oven at a temperature of 50°C. for about an hour. After a number of trial experiments, the following procedure was found to give fairly accurate results :—

Oxalated blood containing known amounts of atebtrin was allowed to soak into the strips of filter paper contained in the inner tube of Vedder and Masen's apparatus (1931) as modified by Chopra, Roy and Das Gupta (1934). It was then put inside an electric oven at a temperature of 50°C. for about an hour. The filter paper strips were reshuffled by means of a clean platinum loop. A small pledget of cotton was placed in the mouth of the tube, which was then inserted into the outer jacket. Ether was poured through the top of the inner tube, so that after filling it up, it was allowed to overflow and fill nearly half the bulb portion of the outer tube. This was then connected to a reflux condenser through which cold water was allowed to circulate and it was immersed in a hot water bath up to the level of the ether contained in the outer tube. After the extraction had been allowed to proceed for two hours, the inner tube was removed and the ether extract contained in the outer tube was heated to drive away the ether. The extracted atebtrin was dissolved in 4 c.cm. of N/10 HCl by alternate heating in a boiling water bath and shaking. As the atebtrin is mixed up with the extracted fatty materials of the blood it usually takes several minutes to get it completely into solution. This is then well cooled in ice and filtered through a small Whatman filter paper. Three cubic centimetres are now accurately measured into one of a set of small test tubes of uniform bore and all made of the same kind of colourless glass tubing and to the others varying amounts of the standard atebtrin hydrochloride solution in N/10 HCl were added. The standard atebtrin solution used contained 0.01 mg. of atebtrin hydro-

chloride per 1 c.cm. of the solution. The total volume in each tube was made up to 3 c.cm. by the addition of varying amounts of N/10 HCl. 0.1 c.cm. of 20 per cent caustic soda solution was next added to each tube followed by 1 c.cm. of amyl alcohol and then thoroughly mixed. The test tubes were left for some time on the table to allow the amyl alcohol layer to separate completely. The yellow colour of the solutions was completely taken up by the layer of amyl alcohol and in the standards the intensity of coloration was proportional to their respective atebtrin contents. The colour of the amyl alcohol layer in the unknown was compared with that in the standards against a white background, the tubes being looked through sidewise.

Experiments with known amounts of atebtrin gave fairly satisfactory results as will be seen from the following table:

	Atebrin hydrochloride added in mgm.	Atebrin hydrochloride recovered in mgm.
1	0.025	0.022
2	0.020	0.016
3	0.020	0.018
4	0.015	0.012
5	0.005	0.005

As solutions of atebtrin exhibit remarkable fluorescence when exposed to ultraviolet light and as the intensity of fluorescence was found to depend upon the atebtrin content, we thought that by this means we might be able to detect minute differences in the atebtrin contents of solutions. But while this holds good for standard solutions of atebtrin (a difference of 0.001 mgm. can be readily detected) it is otherwise when atebtrin extracted from blood is compared with the standard solutions. It was found that ethereal extracts of blood unmixed with atebtrin, when treated in the manner described before, exhibited an appreciable fluorescence when exposed to the ultraviolet lamp and moreover the nature of this fluorescence was not the same as with the standard solutions.

As all attempts to intensify the colour of the atebtrin solutions failed and as the use of the various alkaloidal reagents did not give any better results we employed the device of concentrating the yellow colour of atebtrin into a small volume of amyl alcohol and then making the comparisons.

Summary and conclusion

A simple and fairly accurate method of estimating minute quantities of atebtrin in the blood has been described.

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UNUSUAL IDENTIFICATION OF EXPLOSIVE

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On the 26th March, 1935, about 12-30 a.m., an explosion occurred in a garage at Bomhay and a man was found lying severely injured.

He was brought to the Sir J. J. Hospital at about 1-30 a.m. with severe multiple injuries including a penetrating wound of the abdomen and lacerated left hand with fingers blown off.

He was operated upon at 4-15 a.m., the abdominal wound explored and several pieces of porcelain taken out; similar pieces were also recovered from the wound in the right wrist and his left hand had to be amputated.

On the same day the police sent me the following articles for examination and detection of any explosive substance:—

- (a) A torn blood-stained warm singlet.
- (b) A torn blood-stained cotton singlet.
- (c) A circular metal screw-on lid of a jar with some white powder and pieces of china stained yellow.
- (d) Fragments of china stained yellow.
- (e) Two human finger tips with nails and a piece of skin.

In all exhibits I detected chlorate of potassium and sulphide of arsenic, which forms a highly explosive mixture, a fulminate, and it was apparently in a porcelain jar with a metal screw-on lid.

In my opinion while the man was screwing on the lid, some fragments of the powder remaining outside on the threads of the jar exploded on account of the friction and the man was injured.

Symons has described under the heading 'Unusual Identification of Explosive' a case in which three persons were injured in an explosion which occurred at Colombo in December 1932 where some crackers consisting of chlorate of potassium and sulphide of arsenic exploded accidentally. He found arsenic in the urine of all the three patients collected on 20th December, five days after the explosion. Symons deserves great credit for his ingenuity in tracing the nature of explosive by examination of the urine of the victims.

As this was the only case so far recorded I requested the police to have the urine of this man collected. This was done on 1st April, full six days after the explosion, and 1/250 grain of arsenic was detected by me by Gutzeit's test.

On the 20th April the patient developed dermatitis and on the 29th hair and nail parings were sent to me for examination. Arsenic in the quantity of 1/125 grain was again detected.

Finding of arsenic after a few days is of no unusual interest as after a single dose arsenic is found in the urine within half an hour and continues to be excreted for about ten to fourteen days. Of course when arsenic is given in repeated doses it is found for much longer periods.

Arsenic has indeed been found in the urine of a person 111 days after a course of seven injections of neosalvarsan and even fifteen months after a course of ten injections of novarsenohenzole.

In such an explosion as the one under discussion arsenic enters the system through the wound and also by inhalation of arsenuretted hydrogen which is evolved in the explosion.

This case is of unusual medico-legal importance in that the finding of arsenic would form a very important link in the chain of evidence in proving that in a suspect the injury on his body was caused by the explosion of a mixture containing chlorate of potassium and sulphide of arsenic, which is often used in bombs.

Chlorate of potassium will also form an explosive mixture with sulphur and this mixture is commonly used in India in the manufacture of crackers but in that case no arsenic can be found in the urine of the injured. The finding of arsenic in the body of the victim thus gives an important clue as to the nature of the explosive used and so far as the records go this Bombay case is only the second case of this nature to be reported and it is the first of its kind in India.

A Mirror of Hospital Practice

A CASE OF PSOAS ABSCESS TREATED WITH INJECTIONS OF MILK

By A. C. ROY

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Psoas abscess is generally chronic in nature and secondary to tuberculous disease of the lumbar vertebra but acute psoas abscess is not rare. The following is the report of a case recently seen by me:—

In the middle of November 1934, I was called in to see a case, a Hindu male, aged 45, for a swelling in the left side of the abdomen—duration six weeks.

Previous history.—The patient is a settlement surveyor and he had to work in the field, standing all day long. He had felt some pain in the groin, and in the evening on coming home he used to notice an enlargement of the testes but, after a night's rest, the testes returned to their original size. The patient cannot definitely say which of the testes had enlarged. This happened for two to three years and after that there was no trouble.

Present history.—Early in October 1934 the patient had to go to a place about twenty-five miles away on foot and returned again on foot two or three days later. Four days later he went to a place on foot about eight miles away from his residence and in the afternoon

when he had finished his work he felt a pain in the groin. He lay down for a couple of hours to take some rest thinking that the pain might become easier in the meantime. It may be mentioned that he had not walked such long distances for nearly twenty years. The pain gradually increased and he decided to go home on foot in spite of the pain. After walking about a mile he was unable to walk any further and he had to lie down on the road-side and wait for a passing motor car. While waiting on the road-side he felt a pulsating or throbbing sensation in the left side of the abdomen. He also felt some pain in the testes and in half an hour he was attacked with fever which came on with rigor.

After coming home by car he was given some homœopathic medicine and, on the application of soap over the abdomen, the bowels moved twice in the night. Next morning there was no fever and one testis was found to be double its normal size. There was no pain. He had fever for seven days with daily intermissions. After that he had no rise of temperature. The testes gradually diminished in size and a swelling on the left side of the abdomen was noticed after five to six days. There was some increase in the size of the swelling at odd times. There was no trouble with urine or bowels.

The case was first seen by me in the middle of November 1934 and on examination the following were found:—

Fullness and perceptible bulging of the abdomen was noticed on the left side. The skin over the front of the abdomen on the left side and the skin on the back from the left iliac crest upwards were slightly cedematous. Patient was lying at ease and did not look at all ill.

On palpation a globular swelling about the size of a tennis ball was found in the left iliac fossa occupying the centre of the inguinal ligament. The swelling was hard, hot and slightly painful on deep pressure. The mass was fixed and not movable in any direction. Palpation was suggestive of a deep-seated abscess with pus inside the mass. It was dull to percussion.

There was no difficulty in straightening the leg. There was no pain and he had no difficulty in standing. Evidence of spinal disease could not be detected. Movements of the hip joint were quite free and painless.

The right testis was found to be slightly larger than the left one which was normal in size. There was nothing special about the other systems.

A leucocyte count was not done.

A diagnosis of an abscess was made but the patient did not like to take any medicine for the present.

About five weeks later I was again called in to see the case in December 1934. The swelling was still present and the skin was cedematous as before. This time I decided to explore the abscess with a hypodermic syringe and needle, and so satisfy myself as to the correctness of my diagnosis. I was not even allowed to do this however, leaving aside the question of an operation.

Without satisfying myself as to the correctness of my diagnosis I decided to put the man on an iodide mixture and give him a few injections of milk. He was put on the iodide mixture for nearly three weeks and six bi-weekly injections of fat-free sterile milk were given starting from 5 c.cm. gradually rising up to 10 c.cm. After each injection up to the third there was gradual diminution in the size of the mass which was reduced to one-fourth its original size while it became soft in consistency and the patient felt a little better. He was then asked to walk in the courtyard for five to ten minutes and after walking for a couple of days the mass regained its original size. The remaining injections were given but there was only a slight diminution in the size of the mass although the patient improved in health. The iodide was stopped after the sixth injection and he was given a general tonic internally for nearly three weeks. The mass then began to subside gradually and, from the middle of February 1935, no trace could be found of it even on

deep palpation. Up to the time of writing the mass has not reappeared and the patient is quite all right. He is now carrying on his usual work without any trouble or discomfort. It may therefore be surmised from the absence of any symptoms or reappearance of the mass for the last ten weeks that the case has been cured without any operative interference.

Discussion.—It will be seen that the diagnosis of an abscess was made from (1) the presence of a swelling in the iliac fossa, (2) cedematous condition of the skin suggesting inflammation underneath, (3) palpation suggesting deep-seated pus and (4) from the presence of a hot painful mass.

The diagnosis could not be confirmed by an exploratory puncture.

The other interesting points to note in this are:—

(1) No fever throughout except for the first seven days.

(2) No pain.

(3) No flexion of the hip.

(4) No difficulty in walking even when the swelling was present.

(5) Legs could be straightened without any pain.

The usual operative treatment was not adopted and the patient was treated with injections of milk and iodide internally. It is now very difficult to find out what brought about the cure of the condition. Was it cured by injections of milk or spontaneously by the gradual absorption of the pus formed underneath? or was the absorption hastened by the leucocytosis brought about by the injections of milk? The latter is probably the cause of the cure of the condition as the abscess was not absorbed in three months prior to the injections while the condition was cured following the treatment.

[Note.—It is not clear to us how a definite diagnosis of psoas abscess was arrived at.—Editor, I. M. G.]

A CASE OF SPONTANEOUS SUBARACHNOID HÆMORRHAGE IN AN OLD MAN

By M. ABDUL HAMEED, M.D., M.R.C.P.

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A. G., aged 60 years, father of ten children, went to stool on the morning of the 23rd November, 1934. While there, he suffered severe pain in the back of his head and became unconscious. He regained consciousness after ten minutes and complained of a pain in the back. On the second day the pain in the head and the back became much less. On the third day he again had a severe headache followed by a convulsion which soon passed off. For the next five days, pain in the head and back persisted though not very severe and the patient remained walking about and continued rubbing his back with some liniment.

On the night of the 1st December, 1934 (ninth day of disease), the headache again increased and was followed by some temporary unconsciousness. The next morning the headache was much worse and he felt as if the head was going to burst, as a result of which the patient started crying out and vomited several times. Soon after this he became drowsy, which lasted for twelve hours. The doctor who saw the case at that time found paresis in the left arm and slight proptosis of the eyelids. His

blood pressure was then recorded as 210/110. On regaining consciousness he complained of pain in the head and the back, from where it radiated to the legs as well.

Next morning I was asked to see the case and found him less drowsy and more restless. He was then complaining of pain in the head, neck and back going down to the legs. Rigidity of the neck was present. Pain in the nape of the neck on deep pressure was also elicited. Kernig's sign was present. There was no paresis. Knee, ankle, biceps and triceps jerks were present; abdominal reflexes were also present. Plantar reflex was normal. Pupils reacted sluggishly and were equal. A hæmic bruit was present in the heart. Temperature 101°F ., pulse 78 per minute, blood pressure 170/90. A diagnosis of spontaneous subarachnoid hæmorrhage was suggested. Lumbar puncture was done and blood-stained fluid came out under pressure. On keeping the fluid in a test tube for some time, the red blood cells settled down in a very small number and the supernatant fluid became clear but showed deep xanthochromia. There was no spontaneous coagulation of the fluid. Albumin in the fluid 0.25 per cent, chlorides 0.85 per cent and urea 0.19 per cent; culture, sterile; Wassermann reaction, completely negative; van den Bergh reaction, indirect positive.

The patient was put on bromides and calcium lactate by mouth and he passed a better night. Next morning, drowsiness and restlessness continued and he complained of less headache and less pain in the back. The reflexes with the exception of the abdominal had disappeared. Rigidity in the neck persisted. The blood pressure was as high as before and pulse 72 per minute. Three days later he became more restless; temperature went up to 103.4°F .; blood pressure, 200; pulse, 80 per minute; reflexes, absent. Lumbar puncture at this stage was refused. During the next three days he became more and more restless and delirious; the blood pressure had now a tendency to fall; the pulse and temperature were rising. Another lumbar puncture was done and it showed blood-stained cerebro-spinal fluid under pressure, but the colour of the fluid was not so high as on the previous occasion. Next day he became more deeply unconscious, and his pulse and respiration failed, resulting in his death. No post-mortem examination was allowed.

The typical history of severe headache followed by pain in the back accompanied later on with rigidity of the neck and tenderness of the nape of the neck led me to think that he had some intracranial hæmorrhage, probably subarachnoid. Meningitis could be ruled out on account of the peculiar onset of the symptoms. Cerebral apoplexy is also not considered possible because of the insidious onset and long course of the illness. The typical cerebro-spinal fluid with slight increase in the amount of protein and with van den Bergh indirect positive confirmed the diagnosis that hæmorrhage had taken place somewhere under the arachnoid.

The above case conforms with the 'lumbago and sciatica syndrome' described by Professor Arthur Hall in connection with the different manifestations of spontaneous subarachnoid hæmorrhage and impresses on us the importance which should now be attached to cases of lumbago, especially when they are either accompanied with or preceded by severe headache or migraine. A lumbar puncture in such cases

may help in warding off a fatal issue in a certain number of patients.

As regards the pathogenesis of this condition, it is supposed to be due to leakage from and subsequent rupture of a 'berry aneurysm' situated on a vessel of the brain especially the basilar artery and the circle of Willis. Leaving out trauma, neoplastic growths and the infective processes, such aneurysmal dilatations may be due to three different pathologico-ætiological groups:—

1. Arterio-sclerotic—due to degenerative condition of the vessels.
2. Syphilitic (rare).
3. Congenital.

Out of the above three groups, the first is usually met with in the young adult life, the second one in the middle life, while the third is found among the old. There may be some exceptions to the above rules. The case quoted above was an old man and hence the chances were that he had a degenerative condition of the vessels at the base of the brain. The hæmorrhage was due to an arterio-sclerotic aneurysm probably on the basilar artery. A condition of general arterio-sclerosis was further suggested by the increased amounts of chloride and urea in the cerebro-spinal fluid. I consider the basilar artery the most probable site because aneurysm situated above that area would almost certainly show definite localizing signs, which were absent in this case.

A CASE OF SEPTICÆMIC PLAGUE SIMULATING PERNICIOUS MALARIA

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PLAGUE is sporadic in Beirut. During autumn and winter we see more cases, and occasionally we get a scare of an epidemic. But during the spring and summer the number of cases diminish. I have no satisfactory knowledge about the rodents and fleas of the country to explain this phenomenon. The following case is quite unusual in Beirut and of sufficient interest to warrant publication:

A school girl, twelve years of age, was admitted to the American University of Beirut Hospitals in a state of coma on the 4th of March 1933. She was in perfect health on the 2nd of March. On that day she woke up with a sore throat and vomited bilious fluid twice. At noon her mother was frightened to find that she could not wake up the child. A doctor was called who found that she was in a state of light coma, responding only to painful stimuli, and had high fever. She lives in a malarial district, has a large, hard, spleen and has had malaria, lasting for two months, several years previously. The doctor gave her an injection of quinoplasmine. She had an attack of convulsions during the night, and the next day she was brought to this hospital.

The state of coma, that she was in on admission, simulated a cerebral form of pernicious malaria.

Physical examination.—Well developed, fairly well nourished, temperature 40.5°C. (105°F.), pulse 120, respiration 28 per minute.

Face congested, no rigidity in the neck. Only slight redness in the throat.

Pupils equal and react to light.

No apparent disease in the chest.

Liver palpable, spleen hard and reaches three fingers below the costal arch.

No glandular enlargement.

LABORATORY EXAMINATIONS

Blood count.—Leucocytes 13,700, polymorphonuclears 82 per cent, lymphocytes 6 per cent, large mononuclears 11 per cent and eosinophils 1 per cent.

No malarial parasites found. Several smears were examined.

Urine.—Albumin ++, acetone ++, microscopic examination—many granular casts.

Lumbar puncture obtained clear fluid, which did not come under high tension and showed no pathological changes.

Blood sugar 80 mgm./100 c.cm.

Urea N 50 mgm./100 c.cm.

Chlorides 370 mgm./100 c.cm.

Diagnosis was not clear. We had no cases, at that time, of cerebro-spinal fever or epidemic encephalitis in Beirut. The patient was not diabetic and had no history of chronic kidney disease. Comparatively high blood urea nitrogen in the presence of low blood chlorides could be explained by dehydration due to vomiting and starvation. Apparently this was an acute infection with cerebral involvement. A blood culture was taken, also a throat swab. Her acidosis and dehydration was treated by intravenous glucose and saline, and despite the absence of malarial parasites in the peripheral blood, diagnosis of pernicious malaria was entertained and she was treated by injections of quinine and plasmochin.

Next morning the patient seemed to be much better. The temperature came down to 37.8°C. (99°F.), she could retain some food in the stomach, and could speak intelligently. In the afternoon of the same day she had another rise of temperature and vomited, the vomitus containing dark blood, went into coma again, the temperature rose, the coma got deeper and deeper, and she died at midnight of that day with a temperature of 42°C. (107°F.).

Another blood count made on that day was:

Leucocytes 18,000, polymorphonuclears 72 per cent, mononuclears 24 per cent, lymphocytes 3 per cent, and eosinophils 1 per cent.

As no autopsy was permitted we made a splenic puncture after death and found bi-polar staining oval bacilli, morphologically similar to the plague bacillus. On the same day the laboratory reported that her blood culture showed a growth of a short non-motile Gram-negative bacilli, suggestive of *Bacillus pestis*. This was confirmed by inoculating the culture into a white mouse and rubbing the same on the shaved skin of a guinea-pig. The mouse died three days after inoculation, and the guinea-pig after eight days. On autopsy of these animals, typical *Bacillus pestis* were obtained.

Dr. G. C. Low (Price, 1930) describes a cerebral form of plague which clinically resembles very closely cerebral pernicious malaria. In my case there was a high mononucleosis—11 per cent and 24 per cent—and moderate leucocytosis. Though we have examined many smears, Leishman stain, for plasmodium malaria, we have seen no organisms suggesting *Bacillus pestis*.

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AN INTRACTABLE ULCER ON THE SCALP

By P. A. MAPLESTONE, D.S.O., M.B., Ch.B., D.T.M.
and

L. M. GHOSH, M.P. (Cal.), D.T.M.

(From the Calcutta School of Tropical Medicine,
Medical Mycology Inquiry under the Indian Research
Fund Association)

A boy aged 14 years came to the outpatient department with an ulcer about one and a half inches in diameter on the top of his head.

Previous history.—About three years ago the boy had a continued fever lasting for about six weeks. This was very severe and during its course he had convulsions and was delirious. Towards the end of this pyrexial attack the lobes of the ears, the alar nose and the scalp on the vertex became 'black' (probably gangrenous). One day he scratched his scalp and the whole of it came away over an area about six and a half by four and a half inches, leaving the skull exposed. The ears and nose gradually recovered and appear to have healed without any scarring. The large exposed area on the scalp also gradually lessened and in about six months there was a granulating ulcer about one and a half inches in diameter which was surrounded by a ring of dense scar tissue of the already-healed portion.

Various treatments were tried for a period of about two years without any permanent benefit, though at times the ulcer diminished in size, but it always broke down again and reached its former dimensions. On one occasion a skin graft was done in another hospital and after about six months he was discharged with the ulcer reduced to about one-third of an inch in diameter, but it very soon broke down again.



Before treatment.

Condition on coming to the School.—There was a superficial ulcer on the top of the head covered with unhealthy indolent granulations. The margins showed no signs of healing and the blood supply was poor on account of the ulcer being completely surrounded by a dense ring of scar tissue about two inches in width.

Cultures from the pus only produced ordinary pyogenic organisms, the Wassermann reaction was negative, and the boy appeared otherwise healthy; the only other abnormal condition present was a hookworm infection of moderate severity.

Treatment.—At first the boy was treated as an out-patient; 1/5,000 acriflavine lotion was applied during the day and one per cent ammoniated mercury ointment at night, and at the same time ultra-violet ray treatment was given twice a week. After six exposures had been given there was no improvement and so the boy was admitted to hospital.



After treatment.

The ulcer was treated with simple boracic fomentations three times a day and the exuberant granulations were touched with pure silver nitrate washed off immediately with normal saline. A careful watch was kept and whenever the granulation tissue rose above the surface it was reduced with silver nitrate; this was needed about twice a week.

At the same time muscle extract (Saccolan) was given in doses of 1 c.c.m. injected twice weekly.

The hookworm infection was also eradicated with oil of chenopodium. The ulcer was definitely smaller, the granulations were not so exuberant and the skin edge had a healthy healing border, but improvement was exceedingly slow.

Two per cent scarlet red ointment was now applied at night, the healing edge being protected from it with boro-vaseline ointment, and during the day boric fomentations were continued, and about once a week the granulations were touched with silver nitrate. Muscle extract injections were now only given once a week. After about four weeks of this modified treatment the ulcer had completely healed and the boy was discharged.

Over two months later there was no sign of the skin breaking down so the patient may be regarded as cured.

A CASE OF CYSTICERCOSIS

By J. R. DOGRA, M.D.

CAPTAIN, I.M.S.

and

D. M. AHERN

LIEUTENANT, R.A.M.C.

(From the District Laboratory, Razmak)

A BRITISH soldier, aged 24, was admitted to hospital on 31st March, 1935, complaining of 'fits'.

Past history.—The patient has 8½ years' service in India. In 1931 he was admitted to hospital for pneumonia and was treated for tapeworm during convalescence. He states that at Bareilly he had his first 'fit' while playing football. This was attributed to cardiac irritability of adolescence. Ever since he has suffered from headaches and breathlessness.

On admission.—He has had two 'fits' since admission. One of these came on during examination in the ward. The patient felt a cramp in his left hand which went into a spasm in the *main d'accoucheur* position. He was fully conscious and realized that an attack was coming. A few seconds later his whole body was in tonic spasm and consciousness was lost. He frothed at the mouth with stertorous breathing and deep cyanosis, dilated pupils and head and eyes turned to the right. Knee jerks were absent. The spasm was not violent and passed off and the patient awoke after five minutes but remained drowsy for some four hours. He had no evacuation of urine or faeces.

The patient's general health is good; his intelligence is normal; smokes and drinks very moderately.

During the past 3 or 4 years he has noticed several little lumps in his skin, which disappear in 3 to 4 months. One of these was removed from the pectoral region. It was a cyst—*Cysticercus cellulosae*—with a beautifully invaginated scolex and neck.

Nervous system revealed nothing abnormal. Cardiovascular system revealed mitral systolic murmur which was not conducted and did not alter on exertion. X-ray examination showed no enlargement of the heart. The murmur can be explained by imagining a cyst in the region of the mitral valve. Blood pressure was 140/80.

X-ray examination of the skull and limbs, etc., showed the presence of calcified cysts.

Examination of the faeces was negative for ova. Blood examination showed absence of eosinophilia. The cerebro-spinal fluid was not under pressure, was sterile on culture, and showed presence of sugar but excess of proteins. Wassermann negative.

Conclusion.—A case of 'fits' due to tæniasis is recorded. The great importance of x-ray examination in all cases of 'fits' is pointed out. Removal and subsequent examination of the cyst is not often possible.

Absence of eosinophilia and ova in the faeces was noted by MacArthur (*Medical Annual*, 1934, page 168).

We wish to thank Lieut.-Colonel G. R. Lynn, Officer Commanding, C. I. M. Hospital, Razmak, for permission to investigate the case.

Indian Medical Gazette

SEPTEMBER

EPIDEMIC DROPSY

EPIDEMIC DROPSY was first recognized as a separate clinical entity about sixty years ago. During the intervening years a number of epidemics—using the word in its widest sense and without, we hope, conveying any suggestion that the disease is necessarily an infectious one—of this disease have occurred; the epicentres of these outbreaks (perhaps a safer word) appear to have been in Calcutta, but this location may have been apparent only and due to this city being both the largest town and the largest medical centre in the province. Whenever an outbreak of any importance has occurred within the province, however, there have always been reports of the incidence of the disease in neighbouring provinces and in some instances in more distant countries; following one of the earliest recorded outbreaks in Calcutta there was an outbreak in Mauritius, and last year extensive outbreaks occurred in Benares in the United Provinces and in Assam, so that for this reason, as well as for others that we shall refer to later, epidemic dropsy is a disease of much more than purely local interest. In 1926 there was a sharp rise in the incidence curve, but the 1934 outbreak is probably the most serious that has yet occurred.

There is probably no disease that is attracting so much public attention in Bengal as is epidemic dropsy at the present moment. In the inter-epidemic periods the disease is of interest mainly to the medical investigator, but directly it assumes epidemic proportions there is a spate of the usual questions in the Legislative Council and the Corporation, and public meetings are called to discuss the problem. There is good reason for the alarm that is caused by this disease; it is not uncommonly a fatal one; it causes abortion in a large percentage of pregnant women attacked even when the other symptoms are mild; the frequency and severity of the eye complications alone are sufficient to make it a serious matter; the cardiac involvement often leaves the patient in a condition unfit to do any work during a long period of convalescence; it attacks whole families and, as rest is a very important part of the treatment, a domestic situation is created that is often hard to cope with; and, lastly, our lack of exact knowledge regarding its aetiology makes it impossible to adopt measures for the successful prevention of the disease. Ignorance as to the direction from which danger is coming adds very much to the fear experienced and is liable

to create a state of panic. Another reason why so much public attention is drawn to the disease is that the educated middle-class members of the community are amongst those most severely affected. For guidance, members of the general public naturally appeal to their medical practitioners and the official bodies to their sanitarians; neither are at present in a position to give a readily authoritative opinion on the subject, and both turn to the research worker for help.

Many theories regarding the cause of the disease have been formulated, have lived their day and become history, and have been revived again. It is a disease that seems to lend itself to theorizing on inadequate grounds, and there are probably few diseases about which so much unscientifically collected data and so many isolated observations supposed to have a bearing on the aetiology have been published. The medical literature in this country contains innumerable papers in which one or two cases are quoted proving or disproving, in the authors' opinions, some particular theory. Single instances can neither prove nor upset any theory. For example, the rice-toxin theory, which is probably the best established of the theories of the present day, is not upset by the fact that all the members of one family that have avoided rice for months suffer from clinical symptoms indistinguishable from those of epidemic dropsy. Rice may be the best pabulum for the production of the specific toxin, and yet there may still be other foodstuffs in which it can occur. On the other hand it cannot be assumed just because all the victims of an outbreak are rice eaters that rice is the cause of the disease.

The epidemiological investigations must be raised from the anecdotal to the scientific level. The population subjected to enquiries must be a large one and only selected on a geographical, not on an economic, social or religious, basis; the enquiries must be made amongst those who have not, as well as those who have, suffered from the disease; the mild cases of the disease must also be taken into account and this presents difficulties as it means that a careful medical examination of the whole population at the time of the outbreak is necessary; histories taken at a later date may be misleading. Very few investigations of this nature have been undertaken, but it is only through such investigations that we are likely to reach a solution of the problem.

The medical investigator into the aetiology of epidemic dropsy labours under many difficulties. In the first place he must face his task with an absolutely open mind; there are many theories and it is very likely that one will appeal to him more than another; impartiality is an essential quality in a good research worker. But he will have to depend for the collection of data on assistants who will all have their own theories which will almost certainly prejudice them in

the form their questions take, and lastly there are the patients themselves whose memories regarding recent events and whose answers to enquiries will undoubtedly be affected by popular prejudices. However, the greatest reactionary influence that the investigations have suffered has been the association of the disease with beri-beri and the actual use of the word 'beri-beri' instead of 'epidemic dropsy'. To us there seem to be practically no points of similarity, either in the symptomatology or the pathology, between the disease that is now rampant in Bengal and the beri-beri that has been claimed as the human counterpart of polyneuritis gallinarum of fowls. That in other countries certain epidemics which have been described as beri-beri bear a close relationship to our epidemic dropsy cannot be denied. But this is almost certainly because these have not been epidemics of classical beri-beri and are as distinct from it symptomatically, pathologically, and probably ætiologically as is our epidemic dropsy. In this respect the writers of textbooks might help us by dissociating the two diseases. In the present state of our knowledge there is more justification for placing epidemic dropsy amongst the bowel diseases than amongst the food deficiency diseases, but it would be more satisfactory and less likely to prejudice the issue if for the present it could be left in a section by itself or amongst diseases of uncertain ætiology. There seems little to be gained by emphasizing minor points of similarity between epidemic dropsy and even the 'wet' type of beri-beri that is seen associated with the classical 'dry' beri-beri in certain outbreaks of this disease. The differences in the pathology of the two diseases are so great that any similarity in symptoms may be looked upon as accidental and entirely superficial.

In this issue will be found a number of papers dealing mainly with the symptomatology and

pathology of epidemic dropsy. It was our original intention to publish other papers dealing with the ætiology of the disease but for various reasons these have not been included in the present number. However, the papers that we are publishing deal with the subjects of symptomatology and pathology from the general, the ophthalmological and the dermatological aspects in a fairly complete manner.

We shall be interested to hear from foreign workers who have had experience with the classical beri-beri whether they can detect any single point of similarity between the disease with which they are familiar and our Bengal epidemic dropsy, and we shall feel that one step towards the solution of the problem of the ætiology of epidemic dropsy will have been taken if it is once clearly fixed in the minds of those working on the problem that this syndrome has nothing whatsoever to do with the disease caused by vitamin B deficiency.

[It will be seen from some of the papers published in this issue that the workers at the Calcutta School of Tropical Medicine have been paying special attention to this important problem for many years. When the big epidemic occurred in Purulia during the winter of 1934 a field unit was organized in collaboration with the All-India Institute of Hygiene and Public Health and efforts were made to study this outbreak which was the first one involving rural areas on a large scale. Considerable spadework had already been done when in March 1935 the Governing Body of the Indian Research Fund Association gave a grant for the expansion and completion of this investigation. The problem is now being studied jointly by the two institutions from the clinical, the epidemiological, the bacteriological, and the biochemical standpoint with a view to working out the ætiology of the disease.]

Special Article

A NOTE ON THE USE OF SACCHARIN AS A SWEETENING AGENT FROM THE POINT OF VIEW OF PUBLIC HEALTH

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Introduction

AN examination of a large number of samples of sweetened aerated water indicates that saccharin is being extensively used as a sweetening agent in this country although this is not known to the majority of consumers. As saccharin is about 300 to 500 times sweeter than sugar, and the price is not proportionately higher, there is a great likelihood of this synthetic product being used to a larger extent in all articles of food and drink as a substitute for sugar. It is therefore of importance to

enquire into the possible toxicity of this coal-tar derivative and ascertain if it is desirable to restrict its consumption.

This question was raised in the House of Commons on 28th February, 1918. It was asked that, 'In view of the fact that the use of saccharin, saxin and the like preparations has now increased to a hitherto unprecedented degree and is likely to increase, will the Government obtain and make public the considered opinion of its advisers in the Department of Public Health as to their harmless or harmful character'. The reply given on behalf of the Government was that evidence is lacking: 'there is no foundation for the suggestion that saccharin as a sweetening agent is likely to prove injurious to health'. It was pointed out, at the same time, that a recent report of the Royal Society stated that evidence is lacking

as to whether saccharin is equally harmless to children. The conclusion seemed to be that sugar should be given to children, while saccharin may be quite safely taken in moderate quantities by healthy adults. Even at the present time there is no statutory rule in Great Britain restricting the use of saccharin, although it is possible for the Government to regulate its price by arrangement with the trade.

In Germany, by the laws of 1898 and 1902, saccharin and similar substances were discriminated against, and their manufacture and sale made unprofitable. Saccharin was treated as a poison; when used in foodstuffs it was legally an adulterant. War conditions caused the Government to consider saccharin, dulcin, etc., as aids in a time of need and the enforcement of the law was suspended. During 1917 to 1919 about 1,000 tons of artificial sweetening agents replaced some 300,000 tons of sugar. Although no injurious effects on health could be traced to their use, the new law, promulgated after the war, has taken over almost all the repressive measures of the old law.

In the United States, Folin and Herter (1911) and others carried out extensive investigations, from which it appears that

- (1) saccharin, after prolonged administration, acts as a chronic irritant to the stomach,
- (2) saccharin causes an increased secretion of hydrochloric acid in the stomach, the sweetening effect being lost after a time and the patients taking a dislike to it.

It was also argued that as a sweetener in canned foods and preserves it is a deception, the public believing saccharin to be a form of sugar. The sale of saccharin has therefore been prohibited by law in the United States, and Food Inspection Decisions (nos. 135 and 138) notified that 'the Secretary of Agriculture will regard as adulterated under the Food and Drugs Act foods containing saccharin which on or after 1st January, 1912, are manufactured or offered for sale in the District of Columbia, or Territories or shipped in interstate or foreign commerce or offered for importation in the United States of America'.

The use of saccharin in beverages and prepared foods of various kinds and as a sweetening agent in proprietary medicines has also been prohibited in several European countries.

Chemical and pharmacological properties.—Saccharin is the anhydride of ortho-sulphamido-

benzoic acid $\text{C}_6\text{H}_4 \begin{smallmatrix} \nearrow \text{SO}_2 \\ \searrow \text{CO} \end{smallmatrix} \text{NH}$ and is also

known as glusidum. Commercial saccharin often contains less than 50 per cent of actual glusidum. It is a light, white, minute crystalline powder. One part of saccharin dissolves in 400 parts of cold water, 24 parts of boiling

water, 500 parts of chloroform, 25 parts of 90 per cent alcohol and 48 parts of glycerine. It unites with alkaline carbonates evolving carbon dioxide from the latter and yielding soluble saccharin, which is equally sweet. As a sweetening agent in diabetes, glusidum is used in the proportion of 1 part in 10,000 and $\frac{1}{2}$ grain (30 mgm.) takes the place of an ordinary lump of sugar. Cuslins considers saccharin to be innocuous. Solis-Cohen and Githens (1928) are of opinion that, as it is unnecessary in the management of diabetics and other persons to whom sugar must be prohibited, it should not, on account of possible ill effects, be prescribed for them nor used in medicinal preparations.

Verschaffett (1915) found that the toxicity of sodium saccharinate to seeds and parts of plants is less than that of sodium benzoate ($\text{C}_6\text{H}_5\text{CO.ONa}$) or benzamide ($\text{C}_6\text{H}_5\text{CO.NH}_2$) but greater than the disodium salt of sulpho-benzoic acid ($\text{SO}_3\text{NaC}_6\text{H}_4\text{CO.ONa}$) or sodium phenylsulphonate [$\text{C}_6\text{H}_5(\text{OH}).\text{SO}_3\text{Na.2H}_2\text{O}$]. In 1917 Best studied the action of saccharin on the gastric digestion, and found that in customary doses saccharin is harmless. Blodgett (1920) carried out experiments in which two men and one dog were fed with varied amounts of saccharin over long periods of time, from which no deleterious results were observable, thus leading to the opinion that the use of saccharin by diabetics is harmless. Katsumi Haramaki (1922) studied the influence of saccharin on certain functions of the digestive tract and kidneys, and found that large doses of saccharin increase gastric secretion in dogs, small doses do not influence urinary secretion but 20 per cent causes diminution in urinary output for a time. Benjean (1922), studying the influence of saccharin solutions on fish life, germinations of seeds, enzyme actions and on dog and man, came to the conclusion that the acidity of saccharin is likely to affect these processes and that failure to take into account the acid function is responsible for disagreement in the literature. He is further of opinion that saccharin is harmless in doses permitted by taste. Miyadera (1922) fed a dog with 0.4 gm. of saccharin per kilogramme of body weight and found that this amount has no effect upon N-balance over a period of seven days. Heitler (1920) thinks that the use of saccharin for sweetening purposes should be entirely forbidden on account of its depressing action on the heart. Heilmann (1922) reports that a boy 9 years of age ate 200 saccharin tablets or 3.5 gm. of saccharin; there was delirium, loss of consciousness for a short time, hallucination, motor disturbance, and an enormous urticaria with big blisters containing coagulated serum; recovery was rapid. It is argued that the transitory character of the symptoms induced by the massive doses is a proof of its harmlessness in ordinary use. Van Eweyk (1922) studied the influence of saccharin on the heart

and circulation and found that it has no demonstrable influence in doses much larger than can be given by mouth. Fantus and Hektoen (1923) found that rats may be fed on saccharin in relatively enormous amounts without producing lesions and that such feeding does not interfere with the development of the animals or their progeny or shorten their lives. Schwarz and Buchlmann (1924) found that neither saccharin nor its sodium salt (crystallose) nor p-saccharin inhibits the diastatic action of saliva. Even in concentration of 1.25 per cent an inhibitory action is doubtful. Schwarz and Zelinger (1924) found that peptic and tryptic digestion as determined by the Full-Gross method is not inhibited by saccharin, its sodium salt nor p-saccharin, even in concentrations far beyond those employed for sweetening purposes. Uglow (1924) finds that saccharin has a marked bactericidal action, better than that of phenols and similar to that of salicylic acid. It injures enzymes, phenols and 'zooplankton'. The sodium salt has nearly the same effect as saccharin itself, which this author regards as a poison. Dobreff (1925) studying the effect of the constant use of saccharin upon the digestive juices could not observe any functional disturbance of the stomach glands. Neumann (1924) is of opinion that, in spite of the poisonous effect of saccharin on lower forms of life, the amounts ordinarily used in food had no harmful effect, and caused no appreciable decrease in the percentage utilization of proteins. Lehmann (1929) found that the administration of large amounts of saccharin to mice for three generations appeared to have no effect upon their growth, development, or ability to reproduce. Bleyer and Fischler (1931) studied the effect of saccharin on bio-catalysers and metabolic processes, and could not observe any injurious effect on the influence of vitamins from feeding saccharin. Diemair and Fischler (1931) found that in a rabbit weighing 1 to 1.5 kilogrammes daily doses of saccharin of 25 to 50 mgm. do not affect the blood-sugar level nor the liver glycogen content.

A warning against the indiscriminate use of saccharin was issued by Ross (1915). He stated that 'Recent researches at the McFadden Laboratories of the Lister Institute has shown that saccharin is a powerful auxetic like several other constituents and derivatives of coal-tar; and there is now strong evidence that it is these auxetics in tar and pitch that give rise to the predisposition to the epithelioma known as pitch and sweep's cancer. Saccharin, therefore, should be taken internally with caution, and not for long periods unless the patient is suffering from diabetes or other really serious complaint'. Although this statement does not seem to have been contradicted in any medical journal it appears from a private communication that the suggestion that saccharin may predispose to cancer is not accepted by the present

authorities of the Lister Institute and the Cancer Hospital in London.

Carlson, Eldridge, Martin and Foran (1923), after carrying out an extensive investigation on the physiological action of saccharin in the Hull physiological laboratory of the University of Chicago, summarize the results as follows:—

'1. The prevailing view that, except for its action on the organs of taste in the mouth, saccharin is an inert substance, having no action on organs and tissues, is not tenable. Saccharin acting in the mouth decreases appetite and gastric secretion; in the stomach it increases gastric secretion, and decreases peptic digestion; in the small intestine it decreases absorption; acting on the erythrocytes it decreases hæmolysis. These actions of saccharin cannot be explained by the osmotic factor.

2. Saccharin in the blood, in proportion to its concentration, passes into the lymph, cerebro-spinal fluid, saliva, tears and mammary secretion'.

Summary

A careful consideration of the above investigations will show that saccharin is not an acute poison, and that a daily ingestion of small quantities of saccharin for several months by healthy adults does not seem to produce any injury. It has no food value, and in large doses it may cause headache, gastro-intestinal disturbances and mental depression. If saccharin is freely permitted to be substituted for sugar, it will be taken by old and young, in all states of health, and for all time. There is at present no evidence to establish the claim that saccharin even in very small quantities so taken is harmless. It is therefore suggested

- (1) That the sale of food and drink containing saccharin and similar products should be brought under control, and
- (2) that effective steps be taken so that nobody may unknowingly take these synthetic coal-tar derivatives.

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Medical News

EPIDEMIC DROPSY DISCUSSIONS AT THE BRITISH MEDICAL ASSOCIATION: CALCUTTA BRANCH

UNDER the auspices of the Calcutta Branch of the British Medical Association discussions on epidemic dropsy were held at the lecture theatre of the Calcutta School of Tropical Medicine on Friday, the 14th December, 1934, and on Friday, the 11th January, 1935. On the first day of discussion there was a record attendance of the medical practitioners of the city, so much so that there was not even sitting accommodation available in the large lecture theatre.

On the first day, Lieutenant-Colonel A. D. Stewart, Director of the All-India Institute of Hygiene and Public Health and one of the vice-presidents of the branch, presided. The discussion was opened by Dr. U. P. Basu who traced the evolution of the ætiology of the disease and dealt with its treatment. He was followed by Dr. M. N. De who gave a lantern demonstration of coloured plates from the pathological findings and by Lieutenant-Colonel E. W. O'G. Kirwan, who described the ocular findings of this disease.*

Dr. U. P. Basu said: This disease first appeared in Calcutta in the winter seasons of 1877-78-79-80. In the same year it was imported to Assam and Mauritius by coolies who had gone there from Calcutta. The outbreak was limited to particular quarters of Calcutta and the death rate was high. The famous I. M. S. officer, Colonel Kenneth McLeod, who was at that time occupying the chair of clinical surgery at the Calcutta Medical College, thought that it was a disease *sui generis*, and noted that in this disease the nerve symptoms were completely absent. He was of opinion that it was a different clinical entity from beri-beri and gave it the name 'epidemic dropsy', as the two leading manifestations were its epidemic nature and the presence of dropsy. Indeed no better name could be given and during the half century that has elapsed since McLeod's time there have been vigorous attempts by eminent scientists to merge this disease into beri-beri, but McLeod's 'epidemic dropsy' has outlived all criticisms, and stands to-day recognized as a special disease.

The second outbreak occurred in Calcutta in 1901. This was small and affected a few houses only. The next severe epidemic occurred in Calcutta between 1907 and 1909 and began in July. It rapidly spread from Calcutta to Howrah and thence to the neighbouring districts of Bengal. Lieutenant-Colonel E. D. W. Greig made a special study of this disease and thought that it was a deficiency disease resembling ship beri-beri. The late Sir Pardey Lukis who was at that time principal of the Calcutta Medical College held that it was a form of angioneurosis. Simultaneously Sir John Megaw studied Anglo-Indian cases in the Presidency General Hospital and concluded that it was a form of beri-beri and the cause lay in a poison which was developed in the rice during the hot and rainy season

by micro-organisms. While the I. M. S. officers were searching for the cause of this disease the independent medical profession of Calcutta was not sitting idle. The late Dr. Satya Saran Mitra, an eminent physician of the city, studied the disease in Howrah and came to the conclusion that the cause of the disease was adulterated—mustard oil. He supported his theory by observing that the Europeans and Marwaris do not suffer from this disease as they do not take mustard oil. About the same time Rai Bahadur Dr. Hari Nath Ghose, another distinguished city physician, thought that the epidemic was due to infection of rice by a fungus which probably changed the protein constituents of rice into a product like histamine which was the cause of vaso-dilatation and local œdema. He published his observations in the *Calcutta Medical Journal* in 1909 and 1910.

Since 1910 numerous small outbreaks have occurred in Calcutta, Howrah and in other districts of Bengal from time to time. In 1925 Lieutenant-Colonels Acton and Chopra confirmed Sir John Megaw's view that epidemic dropsy and beri-beri are different clinical aspects of a toxic syndrome caused by the ingestion of poisonous bases formed in the rice by a spore-forming proteolytic bacillus of the *Bacillus vulgatus* group. They further observed that hypoadrenia in particular and hypothyroidism to a lesser extent increased the susceptibility. Then came the largest epidemic of 1926. When the city was in the grip of the fearful epidemic in October 1926 the independent medical practitioners of Calcutta met at a conference at the Calcutta Medical Club to discuss the nature of the outbreak. Dr. U. P. Basu remarked at the conference that epidemic dropsy was altogether a different disease from beri-beri. It was neither due to avitaminosis nor to poisonous bases formed in rice, but that the dramatic outbreaks of this disease in large epidemics, accompanied with fever, having a clean-cut clinical picture, pointed to some acute infection being at the bottom of this disease (vide *Calcutta Medical Journal*, October 1926). In 1927 Acton and Chopra further investigated the disease and held that the œdema was due to capillary dilatation giving rise to increased transudation of fluid into the tissues. Sections of the skin showed increased vascularity in the subpapillary vascular plexus, the vessels were easily seen and round them there was an exudation of lymphocytes and epithelial cells. Side by side with this vascularity there was œdema which separated the white and elastic tissue fibres of the corium. The enormous increase of vascularity of the subcutaneous fatty tissue and the dilated vessels suggested nevoid tissues. In September 1932 a further discussion was held amongst the independent practitioners of this city at the Calcutta Medical Club in which Dr. U. P. Basu stressed the infective origin of this disease on account of its sudden onset, short incubation period, early prostration and the presence of fever. He suggested that at least in the severe types it was very probably a streptococcal infection manifested by progressive anæmia, troublesome diarrhoea, and a tendency to hæmorrhages, such as epistaxis, hæmatemesis, metrorrhagia, bleeding piles and even hæmorrhagic retinitis. In some of these cases the clinical picture was that of

* These two papers will be found elsewhere in this number.

septicæmia. Dr. Basu believed neither in the rice-intoxication theory nor in the adulterated mustard oil theory, because he was convinced that many well-authenticated cases of this disease could be collected where the disease broke out among the members of a particular household, or among the inmates of a particular room in a mess, when a patient infected with the disease was admitted to that particular house or room, although the source of rice supply remained the same immediately before and during the outbreak of the disease. In 1934 another epidemic broke out and instead of being limited to Bengal as before it spread to many healthy towns of Behar and the United Provinces. In Benares the disease has affected the Bengalis severely, but not the other rice-eating communities, although the source of rice supply to the Bengalis and non-Bengalis remains the same. The rainy season has always been invoked in the ætiology of this disease in order to establish the deterioration of rice due to damp storage, but the first appearance of the disease was in the winter months of the year 1877. Again in 1922 there were 83 inches of rainfall in the city of Calcutta and the whole of the district of Kidderpore was flooded but epidemic dropsy never broke out in that year. The vitamin deficiency theory has already been explored, nor can the adulterated vegetable ghee theory hold place in the ætiology of this disease, because unimpeachable evidence is available that it is rampant in families which consume the best foodstuff available in the market.

Of all theories of intoxication the one propounded by Rai Bahadur Hari Nath Ghose, namely, that of histamine poisoning, appeared to be reasonable, as it explained to a great extent the pathological lesions seen in this disease, but the great drawback of this theory is that it did not explain the dropsy that is present, which is its cardinal feature. According to Samson Wright, Professor of Applied Physiology in the University of London, œdema of the tissues that can be demonstrated by pitting on pressure is not evident in histamine poisoning. Schlittenhelm and Schlecht investigated an outbreak of œdema in the labour corps attached to the German army and proved that protein starvation was at the root of the epidemic œdema. We have also seen that administration of proteid food materially benefits the condition. The question therefore naturally arises in one's mind, is epidemic dropsy due to infection on the top of hypalbuminosis of the blood serum? The question cannot be answered unless the protein content of the blood serum is investigated in a large number of cases. Study of the biochemistry of this disease has shown deficiency in the calcium content of the blood serum. It is worth while to study the cholesterol content of the blood, as Cannon, after two years' research in Hongkong on 600 cases of beriberi with 80 necropsies, found low cholesterol content of the blood.

Treatment.—Whatever may be the ætiology of this disease, change of soil, especially change of climate, materially improves the condition. I have known desperate cases verging on death and carried by stretcher to health resorts markedly benefited simply by the change. No medical treatment was carried on in such cases, but rest in bed in healthy climates improved the condition. The next factor is the addition of animal protein to the diet. The addition of meat and eggs to the diet is certainly helpful, and the administration of calcium in any form is beneficial.

In 1930 Lieutenant-Colonel Chopra and Dr. U. P. Basu found out that the tincture of ephedra prepared from the Indian species, by virtue of its containing larger quantities of dextro-rotatory isomer pseudo-ephedra and comparatively less ephedra, possesses the property of stimulant action on the musculature of the arteries; a powerful stimulant action on the myocardium; the small quantity of ephedrine exerts its vaso-pressor effects through the vasomotor nerve endings and consequently stimulates the acceleratory mechanism. Our observations were confirmed by Lieutenant-Colonel E. H. Vere Hodge in his article in

the *Indian Medical Gazette* on this subject in November 1931 and by Lieutenant-Colonel Chopra himself and Dr. Sunil Chandra Bose in an article on the subject in the *Indian Medical Gazette* in November 1933.

On the second day of the discussion Dr. U. P. Basu, one of the vice-presidents of the branch, presided and many leading medical men took part in the discussion. Rai Bahadur Dr. Hari Nath Ghose opened the discussion and emphasized the probability of histamine intoxication as being at the root of the disease. Dr. Sarat Chandra Dutta of Howrah said that during the course of his practice extending over nearly half a century he had been a stalwart supporter of the rice theory but that with his advancing years and wider experience on the subject he did not think that rice has any place in the ætiology of this disease. Dr. E. Muir described his personal experience of an outbreak in Purulia in the district of Manbhum and emphasized the importance of deteriorated rice in the ætiology of this disease. Dr. Coltman of the Presidency General Hospital remarked that he studied the disease amongst the Anglo-Indians in the Presidency General Hospital in 1929 and came to the conclusion that it was of an infective origin; he quoted the findings of Major Shanks, the Professor of Pathology, Calcutta Medical College, who from post-mortem examinations in epidemic dropsy cases thought that the disease was caused by infection. He also quoted Lieutenant-Colonel Boyd who fed monkeys with samples of diseased rice said to have caused the disease but failed to produce the disease in them. Lieutenant-Colonel Kirwan next read a report of the chemical examination of fluid removed from the eyes of patients suffering from glaucoma seen in this disease. Dr. Muir asked Lieutenant-Colonel Kirwan if any control examination of fluids removed from normal eyes had been made. Dr. Basu then wound up the discussion by thanking the distinguished audience for the interest they had evinced and his colleagues who had taken part in the discussion for the new light that they had thrown on the matter. Dr. Basu confessed that up till now we have conceived many theories but have not succeeded in bringing to light anything. Lieutenant-Colonel Kirwan's isolation of histamine from the glaucoma fluids in these cases is a distinct advance on the subject. We all know that the symptoms of shock appearing after injury are due to the liberation of histamine from the tissues, so that, as Lieutenant-Colonel Kirwan has himself said, it remains to be seen whether the histamine isolated is primary or secondary. The difficulty however with histamine is that it cannot explain the œdema. [The president was interrupted by Rai Bahadur Hari Nath Ghose, an advocate of the histamine poisoning theory, who said that œdema was due to secondary infection on the top of histamine poisoning.] Replying to Dr. Muir, Dr. Basu said that the disease first broke out this year in a virulent form in Purulia and if infected rice were the cause why should this disease occur particularly this year and in an epidemic form. Could it be possible that the rice remained innocent all these years and suddenly deteriorated this year all over the place to produce an epidemic?

ALL-INDIA OPHTHALMOLOGICAL SOCIETY

As a result of the deliberations of the above Society at its Fourth Conference in Madras on the 22nd, 23rd and 24th April, 1935, at which the urgent need for more co-ordinated and energetic measures in connection with the prevention of blindness in India was emphasized, the Committee respectfully submit the following to the authorities concerned both in British India and the Indian States.

1. Before registration, certification of licensing of qualified medical practitioners, midwives, or others concerned with the conduction of child-birth, a guarantee be given by competent medical authority that aspirants for such registration, certification, or licence possess a practical knowledge of the prophylaxis of ophthalmia

neonatorum, preferably Crede's method or a modification thereof.

2. That in view of the very serious menace to sight constituted by that condition sometimes called xerosis of the conjunctiva or keratomalacia, but actually the expression of a multiple deficiency complex (a food problem), the authorities concerned, namely, the Government of India, the Indian Research Council and the Local Governments in British India and the various governments of the Indian States, do require of the special medical officers employed on nutritional research, a report on the human condition as seen in the hospitals, and practical suggestions as to how the food defects concerned may be met by alternative food crops or similar measures adopted in co-operation with the Agricultural Department or other departments concerned with this problem.

3. That the statements quoted from official sources by the International Association for the Prevention of Blindness in their report for 1934 on the frequency of trachoma in certain regiments of the Indian army is viewed with concern. Over 70 per cent of the Sikhs in certain North-West Frontier regiments are said to be affected. The percentage of infected Punjabis, Pathans and Dogras in these units is also very high. It is respectfully requested that the authorities under the Government of India responsible for these figures explain how they were arrived at, and what criteria, if any, were employed in making the diagnosis of trachoma. Should the figures be correct, then these regiments constitute a grave danger not only to the Indian army in time of war, but—more important to this society—a grave danger to the civil population of those districts to which such regiments may be transferred in time of peace. It is suggested that the authority concerned—in this case the Government of India—takes the necessary steps to institute an enquiry under competent specialist control to check the figures quoted, and to lay down rules of guidance regarding the diagnosis of trachoma.

4. That legislation regarding the inspection of the eyes of school children be introduced at a very early date by all the authorities concerned throughout British India and the Indian States.

5. That the authorities concerned tighten up the administration of the machinery dealing with the prevention of smallpox.

6. That the authorities concerned institute propaganda methods for the instruction of the uneducated with regard to the prevention of blindness, especially in the rural population.

Such methods, in the beginning, might consist of:—

(i) Broadcasting by radio in the vernacular where the necessary machinery is established.

(ii) Distribution of pamphlets and posters through the medical and educational departments.

(iii) The employment of a travelling motor unit organized for propaganda work fitted with cinema, posters and pamphlets, and a dispensary for urgent ophthalmic aid. This motor unit to be manned by a cine-operator and lecturer, and a qualified ophthalmologist, so that first aid may be given on the spot at the places of demonstration.

The films and posters used must be simple, topical and sufficiently colourful to arrest the eye, and as far as possible self-explanatory. Films should be on the lines of the health films used by the Rockefeller Foundation in India. Captions, if any, must be in the vernacular. The lecturer must understand and speak the vernacular, and be able to give a running commentary.

7. That, as syphilis, both congenital and acquired, is such a potent cause of blindness, the authorities concerned—the Local Governments in British India and the various governments of the Indian States—institute and foster—or extend if already in existence—the branch of their medical departments devoted to the treatment of venereal diseases. Such special departments should be modelled, in so far as possible, on the lines of similar departments already in existence in Great Britain.

CHETTINAD MEDICAL ASSOCIATION

THE usual monthly meeting of the above association was held at the S. M. Hospital, Tirupattoor, under the presidency of Dr. Mangalam Pillai, as the president was absent. About twenty members were present; after the tea arranged by the hosts, Dr. T. S. Shetty, the secretary, read the minutes of the association.

Dr. T. S. Shetty gave three interesting case reports, two of diphtheria cases, one in a child of three years, another in an adult of 35 years, both Indians. Curiously enough at the same time, one coming from Madura and the other from Ramnad district. Dr. F. Ysander cited two cases from his experience.

There was a discussion on the advisability of doing tracheotomy in advanced cases of breathing trouble. But Dr. F. Ysander suggested that intubation is a better method and easily done, but hospitalization is essential lest the tube be coughed out. Dr. Shetty spoke about a very interesting case of cerebellar abscess in a case of neglected mastoid infection.

Dr. Victor reported on two orbital tumours. Dr. F. Ysander demonstrated some interesting x-ray films of the gastro-intestinal tract. After this an interesting lecture on 'record keeping' was delivered by Dr. D. O. Sandel who suggested some novel and very easily manageable record-keeping methods for all outpatients, both in private and public institutions.

THE LEISHMAN MEMORIAL PRIZE

MAJOR H. T. FINDLAY, Royal Army Medical Corps, has been awarded the Leishman Memorial Prize for the year 1934, consisting of a silver medal and a sum of £30, for his work in the interests of military pathology.

The Leishman Prize (Officers) is awarded annually for the best piece of work in any branch of medicine, surgery or the allied sciences or in connection with the general duties of the Royal Army Medical Corps, by an officer of the Royal Army Medical Corps, or of the Army Dental Corps, or by an officer removed from either of these corps but still on the active list.

NORTH PERSIAN FORCES MEMORIAL MEDAL

CAPTAIN P. SHANNON, Indian Medical Service, has been awarded the North Persian Forces Memorial Medal for the year 1934 for his paper on 'A Study of Trachoma in Baluchistan' published in the *Indian Medical Gazette* of December 1934.

The North Persian Forces Memorial Medal is awarded annually for the best paper on tropical medicine or hygiene published in any journal during the preceding twelve months by a medical officer, of under twelve years' service, of the Royal Navy, Royal Army Medical Corps, Royal Air Force, Indian Medical Service, or of the Colonial Medical Service, provided the memorial committee consider that any of the papers published has attained a standard of merit justifying an award.

THE ALEXANDER MEMORIAL PRIZE

MAJOR T. O. THOMPSON, Royal Army Medical Corps, has been awarded the Alexander Memorial Prize for the year 1934, consisting of a gold medal and a sum of £40, for his work in the interests of military hygiene.

The Alexander Memorial Prize is awarded annually to the officer of the Royal Army Medical Corps who has by professional work of outstanding merit done most to promote the study and improvement of military medicine, military surgery, military hygiene or military pathology.

CHARAK MEMORIAL PRIZE

A PRIZE of the value of one hundred rupees will be given for a thesis on the antiquity of syphilis (venereal diseases) in India.

The thesis should be in English. Short quotations from original references in Sanskrit or other languages will be accepted.

Complete bibliography of authors, facts and figures, and data of matter in the thesis should be given.

The thesis should be submitted, typed on one side only, on foolscap size paper with double spacing and margin on the left, and should not exceed fifty such pages. The manuscript should reach the editor, *Indian Journal of Venereal Diseases*, 94, 97, Girgaum Road, Bombay 4, by registered post, by the 30th December, 1935.

There is no territorial bar for competitors.

The thesis submitted will be judged by a small board of examiners.

The winning thesis will become the property of the *Indian Journal of Venereal Diseases*, and will be published in one of the issues. The journal will have its copyright.

No reason will be given for refusal or rejection of any or all the theses submitted. The decision of the editor shall be final on all matters.

An authoritative, literary and scholarly article will be appreciated.

RAI SHAMBHU DAYAL SAHIB GOLD MEDAL

A GOLD MEDAL called the 'Rai Shambhu Dayal Sahib Gold Medal' will be presented for the best prize essay on a public health subject to be announced each year.

The subject of the next essay is 'A practical scheme for rural reconstruction with special reference to matters pertaining to public health'.

The competition will be open to the general public, including the medical and the public health workers in the United Provinces.

The essay is to be written in Hindi and should not exceed 3,000 words in length.

Essays should reach the Medical Officer, Provincial Hygiene Institute, United Provinces, Lucknow, by 30th November, 1935.

The name and address of the competitor must be distinctly written on each essay submitted and the envelope should have the words 'Prize Essay' in the top left-hand corner.

The Director of Public Health, United Provinces, shall judge the merit of the essay and his decision with regard to the award of the medal shall be final. No correspondence will be entered into on the subject of competition. No essay will be returned.

WILLIAM GIBSON RESEARCH SCHOLARSHIP

With reference to the notice regarding the above scholarship for medical women which appeared in our December issue last year, we are informed that the council of the Royal Society of Medicine has awarded this scholarship to Dr. F. Stephen-Lewis of the University of the Witwatersrand, Johannesburg.

Dr. Stephen-Lewis proposes to carry out a research on 'Further study in the chemistry of South African plants, particularly those used by the natives as medicines', and 'Investigation of physiological data for the various native tribes'.

INDIAN MEDICAL COUNCIL

LIEUTENANT-COLONEL P. S. MILLS, M.B., B.S. (Lond.), D.T.M. & H. (Lond.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), I.M.S., Officiating Inspector-General of Civil Hospitals, Bihar and Orissa, has been duly nominated by the Government of Bihar and Orissa, under clause (a) of sub-section (i) of Section 3 of the Indian Medical Council Act, 1933 (XXVII of 1933), as a member of the Medical Council of India, *vice* Colonel H. C. Buckley, I.M.S., resigned.

Lieutenant-Colonel N. S. Sodhi, M.C., L.R.C.P., L.R.C.S. (Edin.), L.R.F.P. & S. (Glas.), D.M.R.E. (Cantab.), D.T.M. (Edin.), L.M. (Dub.), I.M.S., Officiating Inspector-General of Civil Hospitals, Burma, has been duly nominated by the Government of Burma, under clause (a) of sub-section (i) of Section 3 of the Indian Medical Council Act, 1933 (XXVII of 1933), as a member of the Medical Council of India, *vice* Lieutenant-Colonel P. K. Tarapore, I.M.S. (retired), resigned.

Current Topics

The Treatment of Cerebro-spinal Fever

By J. M. KENNEDY, M.B., D.P.H.

Senior Medical Officer, Lodge Moor Hospital, Sheffield

(Abstracted from the *British Medical Journal*, 13th April, 1935, p. 756)

Diagnosis

THE disease presents no difficulty in those cases which show the classical signs of meningitis, such as headache, neck rigidity, and Kernig's sign, but it is in respect of those cases where the above signs are wanting that I wish to make a few remarks. I have found that in most infants of about 1 year and under a correct diagnosis can only be made after lumbar puncture. These cases merely showed the following features:

(a) A remittent type of temperature of about 102°F., for which no definite cause could be found.

(b) Irritability and restlessness, which became more marked in routine examination.

(c) Complete absence of neck rigidity, head retraction, and Kernig's sign.

(d) Several cases showed a very heavy and dull appearance of the eyes, with slow gyrate movement of the eyeball, to which latter sign I attached some importance.

Speaking of the symptomatology of cerebro-spinal fever, Mogilinski states:

'The onset in infants differs considerably from that in adults, in whom it is sudden and accompanied by

shivering, vomiting, high fever from the first, headache, rigidity of the neck and limbs and in most cases (60 to 70 per cent) herpes labialis. In infants, on the other hand, it is rare to find an onset accompanied by convulsions, high fever, and vomiting, but the disease usually begins insidiously, without meningeal symptoms or herpes. In some cases there may be signs of respiratory disease, followed later by meningeal symptoms'.

The fever seems to bear little or no relation to the severity of the symptoms, except immediately before death, when the temperature may reach hyperpyretic degrees—107°F. or over. The pulse appears to be as variable as the temperature when the patient is seen in the early days of the disease; it is usually soft, full, and slow. Often one sees a patient with a temperature of 102° and a pulse rate of 60. When the patient is restless and suffering much pain the pulse is usually small and rapid.

As regards the special symptoms—vomiting, headache, and rashes—about 98 per cent of patients give a history of vomiting in the first day or so of the disease, but it is not seen much in hospital when they are under treatment. Most of my patients complained of severe frontal headache during the early days of their illness. The large purpuric type of rash resembles that seen in an acute pyæmic infection, and appears rapidly. The prognosis is very grave. The other type of hæmorrhagic rash—the petechial variety—is not so likely to be fatal, and resembles the 'rose spot' of typhoid fever or fresh flea-bites. Herpes usually appears around the

mouth, but may occur in any part of the body, such as the hands, feet, legs, around the vulva, and the anus. The most characteristic point about the herpes is that it appears with unfailing regularity on the fourth day of the disease, and also that the contents of the vesicle contain the meningococcus.

Lumbar puncture as an aid to diagnosis

Too much stress cannot be laid on the value of lumbar puncture. I consider that it is a simple and harmless operation, and should be performed more often—especially during epidemics of cerebro-spinal fever—in those patients where the slightest suspicion arises. I have carried out over 1,500 lumbar punctures, and never have I seen any fatal results follow the operation. Lumbar puncture is one of the most valuable aids and means at our disposal for arriving at a correct diagnosis. The macroscopic appearance of the cerebro-spinal fluid usually gives a fair idea of the type of meningitis. Should it be the least turbid, anti-meningococcal serum should be given forthwith, without waiting for a bacteriological report. On the other hand, a clear fluid does not eliminate cerebro-spinal fever.

Present lines of treatment

In the treatment of cerebro-spinal fever I think it is generally agreed that the best results have followed the introduction of anti-meningococcal serum. When Flexner read his paper on the treatment of cerebro-spinal fever by the use of anti-meningococcal serum he gave the mortality rates in epidemics before serum was introduced or applied as follows: New York, 73 per cent; Edinburgh, 80 per cent; Glasgow, 74 per cent; Belfast, 70 per cent; France, 75 per cent; Belgium, 77 per cent; Palestine, 80 per cent.

He then showed a mortality of 30.9 per cent on 1,294 cases treated with anti-meningococcal serum.

When Flexner introduced his serum he advised the following method in the treatment:

A daily lumbar puncture and intrathecal injection of 30 c.cm. of serum for at least three or four days, in adults, with a proportionately smaller injection, if thought advisable, in infants. In more severe cases he considered that larger doses of serum should be given at even shorter intervals, say, every twelve hours, and that this treatment should be continued for as many days as were necessary to clear the cerebro-spinal fluid and to alleviate the symptoms of meningitis.

Since the introduction of serum many observers have differed as to the best route for its administration.

Herrick, believing that the disease originates as a generalized meningococcus sepsis, endeavours to sterilize the blood stream by massive doses of anti-meningococcal serum given intravenously. Banks states that it has been his practice to give large doses of multivalent serum—for example, an initial dose of 100 to 200 c.cm. intravenously—and to do repeated lumbar punctures at twenty-four-hour or forty-eight-hour intervals, with or without an initial intrathecal administration of serum.

Cantacuzène has published perhaps the best results ever known, and he has reduced his mortality rate as low as 4.8 per cent. In brief, serotherapy is administered as follows:

- (a) Intraspinal inoculation as early as possible.
- (b) Daily inoculation of 25 to 35 c.cm., the operation being always preceded by microscopical examination of the cerebro-spinal fluid, which should serve as a guide.
- (c) Stop the inoculations as soon as the meningococci have disappeared and the purulent character of the fluid is changed, otherwise there is a danger of serous meningitis.
- (d) Inoculate the serum as closely as possible to the infected site and in young children perform intraventricular injections through the fontanelle.
- (e) The intraspinal injections should be accompanied by intramuscular inoculations.

Personal experience

During the years 1931-2-3, 369 cases of cerebro-spinal fever were admitted into Lodge Moor Hospital,

Sheffield, of which 132 were fatal, giving a mortality rate of 33.06 per cent. Of these 132 deaths, fifty-two occurred within forty-eight hours of coming under treatment, which, when deducted, gives a mortality rate of 25.26 per cent. In 1931 there were eighty-five cases, with thirty-six deaths (42.35 per cent). In 1932 there were 160 cases, with forty-nine deaths (30.62 per cent). In 1933 there were 124 cases, with forty-seven deaths (37.9 per cent).

The following table shows the age incidence and death rate amongst the 369 cases during the three years:

Age	Cases	Deaths	Death rate, per cent
Under 1 year	25	15	60
1 year and under 5 years.	76	25	32.8
5 years and under 30 years.	218	67	30.7
30 years and over	50	25	50
TOTAL	369	132	33.06

During the year 1931 serum produced in Great Britain, France, and the United States of America was used, in the hope that we should find an efficient or active remedy, but it gave rather unsatisfactory and disappointing results. Towards the end of 1931 we were advised to try a serum produced in London. We used this serum exclusively for the treatment of our cases during the years 1931-2-3. By the results obtained during 1932-3 this serum would seem to have been very effective.

Of the 188 cases which recovered during 1932-3 by the use of this serum, I found that meningococci disappeared completely from the cerebro-spinal fluid after one intrathecal injection in ninety-eight cases, or 52.1 per cent, and that the meningococci disappeared in 148 cases, or 78.7 per cent, after having three consecutive intrathecal injections of serum. I believe that the presence or absence of the organism in the cerebro-spinal fluid is the only criterion by which we can form an opinion as to the value of the serum. I am inclined to agree with Dr. Cantacuzène that once the cerebro-spinal fluid has become sterile further intrathecal injections are dangerous, but it has been my practice to continue until the cerebro-spinal fluid has been found to be sterile on three consecutive days.

Out of the total of 132 deaths, the fifty-two occurring within forty-eight hours of admission to hospital were regarded as fulminating types of the disease. Of the remaining eighty deaths, it was found that in sixty-five instances (81.25 per cent) the cerebro-spinal fluid remained persistently positive in spite of daily intrathecal injections of serum.

It is my opinion that the intrathecal method is the best, and gives the most satisfactory results. I used this method in all cases, and in those cases which showed signs of a septicæmia (by the appearance of purpuric or petechial hæmorrhages) intravenous and intramuscular injections were used in addition.

We are informed that the cerebro-spinal fluid contains no complement, and thus no direct bactericidal action is likely to occur. The action of the serum is probably that of an increased phagocytosis. Physiologically, the lining membrane of the choroid plexus and the sub-arachnoid space is impermeable to substances passing from the blood to the cerebro-spinal fluid, except in the case of a few drugs. Serum injected intravenously must not reach the subarachnoid space, and, even if it does, must be in only very small and diluted quantities, and nothing like the amount which is brought into immediate and direct action by the intrathecal method.

I think that one can afford to neglect the clinical signs and symptoms that appear in the treatment of

cerebro-spinal fever, and to attach the greatest importance to the condition of the fluid, as to whether meningococci are present or absent. Rigidity and irritability are increased by the intrathecal injection of serum.

Some authorities advise cisternal puncture in the treatment of cerebro-spinal fever, but this method does not appear to me to have any advantage over the more simple lumbar puncture. It entails more risks, and should only be attempted by one skilled in the operation. By doing lumbar puncture one is able to drain the cerebro-spinal fluid very well and inject serum without any danger; the field of operation is quite safe, whereas in cisternal puncture the field of operation is exceedingly dangerous, and the injection of serum has to be done very cautiously. If one does not obtain cerebro-spinal fluid by lumbar puncture in patients suffering from cerebro-spinal fever, it is my experience that it will not be obtained by cisternal puncture, as the blockage usually occurs at the foramina of Luschka and Magendie, and has produced an internal hydrocephalus, so that the only thing that is of any value is ventricular puncture, which can be done quite easily in infants if the fontanelle is still patent.

Choice of anæsthetic

I prefer to do all lumbar punctures under a local anæsthetic, avoiding a general anæsthetic in all cases except those where a wildly delirious patient necessitates its use. In doing punctures under a local anæsthetic I give either morphine $\frac{1}{3}$ grain or heroin $\frac{1}{6}$ grain, according to the age of the patient, about a quarter of an hour beforehand, followed by 1 or 2 c.cm. of a 2 per cent solution of novocain. With a general anæsthetic, when the patient is coming round he is exceedingly irritable, noisy, and very restless, and even the subsequent administration of morphine or heroin has very little effect.

Death occurring during the acute stage of cerebro-spinal fever is usually brought about by respiratory failure. I have seen numerous cases in which this condition occurred, and artificial respiration was carried out for several hours while the heart continued to beat regularly and forcibly. Under general anæsthesia respiratory failure is more liable to occur, and this is another reason in favour of a local anæsthetic. Another point of interest may be mentioned here. The meningococcus is not so delicate an organism as is generally believed. As a routine, about 5 c.cm. of cerebro-spinal fluid was collected from the patient by punctures and run into a similar quantity of glucose broth. This was incubated overnight, and the following morning a tube was forwarded to Dr. Scott (of the Ministry of Health) by ordinary post, in most instances arriving quite safely. From a broth culture I inoculated a blood agar slope, which gave me a good growth. This was washed off with normal saline containing 0.5 per cent phenol, and an emulsion obtained, which I put up against the four standard sera and the type of organism identified. The typing of the meningococcus during an epidemic is exceedingly valuable, as the particular type is always kept in view, and any change that may occur in the types is recognized and, if necessary, the serum altered.

Conclusion

During an epidemic of cerebro-spinal fever, when a patient complains of headache, and has some pain or tenderness on flexing the head—not necessarily neck rigidity—the examination of the cerebro-spinal fluid should be carried out without further delay. One cannot stress too much the great importance of lumbar puncture in infants where there are no definite signs or symptoms of meningeal irritation other than pyrexia, with fretfulness or irritability. I am convinced that a number of infants die during an epidemic when the disease is not even suspected.

During an epidemic serum should be prepared at once from the type of organism causing the disease,

and freshly isolated strains of the infecting organism should be sent at regular and frequent intervals to the manufacturers of the serum. Once the disease is diagnosed, or when a turbid cerebro-spinal fluid is obtained, some anti-meningococcal serum should immediately be given intrathecally, without awaiting a bacteriological report on the fluid.

In treating the disease the condition of the cerebro-spinal fluid is very important, and as soon as it becomes sterile further punctures and injections of serum must be carefully considered. It has been my practice to obtain three consecutive sterile fluids before stopping the injections, though after I have obtained the first sterile fluid I reduce the quantity of serum. I believe that we do more harm than good by continued drainage of the cerebro-spinal fluid and intrathecal injection of serum. The examination of a direct smear is not sufficient evidence of persistent infection; the fluid must be cultured before it can be said to be sterile. Frequently the rigidity is increased by the intrathecal injection of serum, and no great importance need be attached to this, provided that the cerebro-spinal fluid is sterile on culturing.

In conclusion, I do not claim that my results are any better than those of other workers, but I think I can safely state that the quantity of serum used and the number of lumbar punctures performed are much less and that the number of days the patient is under active treatment has been reduced.

Uretero-vaginal Fistula

By A. E. WEBB-JOHNSON, C.B.E., D.S.O., F.R.C.S. (Eng.)
(From the *Lancet*, 11th May, 1935, Vol. I, p. 1083)

It would be difficult to exaggerate the terrible discomfort which a woman must suffer if she has a constant leakage from the vagina as the result of a fistulous communication with the urinary tract. The external genital anatomy of women provides no such convenient arrangement as that with which men are blessed, and the instrument maker has failed to produce an apparatus which will ensure a woman's comfort when she is suffering from urinary incontinence. It follows that she is generally dependent on primitive arrangements in order to absorb the leaking urine and save her clothes and the furniture of herself and her friends from damage. In addition to the discomfort which necessarily results—and this must amount to mental agony in a fastidious woman—the constant presence of a pad soaked in urine, which is often infected, sometimes leads to most distressing soreness of the genitals and thighs.

The surgeon is naturally distressed when he sees a patient in such a miserable predicament, but his distress is magnified a hundredfold when the state of misery is the result of an operation which has been embarked upon with confidence and hope.

The justification for confining my remarks to uretero-vaginal fistula lies in the fact that during the last 23 years I have had to deal with 23 of these cases, and have arrived at certain conclusions as to the best line of procedure in preventing and treating the condition. As I have stated, this serious condition is generally the direct result of surgical intervention. All my cases except one have been the result of a pelvic operation. In the odd one, which was the first I had to deal with, the fistula developed after a difficult parturition, protracted labour, and instrumental delivery.

Injury to the ureter: its prevention and repair

Before considering the question of treatment it will be well to devote a little time to the discussion of the prevention of injury to the ureters and the steps to be taken at the time if the surgeon realizes that damage has been done. The uterus, bladder, and lower ends of the ureters are in such close relationship, and the normal anatomical arrangement may be so distorted when the uterus is the site of a tumour, that it is not surprising that the ureter is injured sometimes.

Hysterectomy is so frequently performed that one may say that the ureters are in danger almost daily in the hospitals of a large city. Accidental damage still occurs too frequently, and it should be the guiding principle of the gynaecologist that it ought never to occur. In cases of fibroid tumour of the uterus the accident may happen without being noticed, but in Wertheim's operation for carcinoma, in the course of which the ureters are isolated, and maybe their blood supply imperilled, the surgeon is well aware of the risk being run and has the ureters under his direct observation. In a case of carcinoma it might be impossible to avoid damaging a ureter, but in the operation of hysterectomy for fibroids it should be one of the rarest of all accidents instead of one which is fairly common.

Twenty-one years ago Sir John Bland-Sutton opened a discussion on this subject at the Medical Society of London and the discussion made it clear that the ureters were often injured during the performance of abdominal hysterectomy. The injury may not be noticed. Bland-Sutton expressed the opinion that it is possible and probable that a ureter has been tied in the course of hysterectomy and the patient has recovered without anyone having a suspicion that such an accident has happened. It is indeed true that there may be no serious effect if the urinary tract is free from infection, but it is well to bear in mind that it may be some time before interference with the lumen of the ureters is revealed. I have recently had in my wards a case of nephrectomy for pyonephrosis in a woman who had a pelvic operation three and a half years ago. I doubt not that the obstruction to the ureter which was one inch from the vesical orifice was the result of the pelvic operation. While nephrectomy is never undertaken without the most careful investigation of the urinary tract, surgeons must be doubly cautious if the patient has had a pelvic operation.

The ureter has been deliberately tied after accidental division without untoward signs. Numerous gynaecologists have confessed to tying the ureter and dropping it back. This has only to be mentioned to be condemned. Bland-Sutton emphasized the importance of dealing with a cut ureter at the time. As he wittily pointed out—'Kidney tissue is very precious. Many persons get on very well in the world with very little brains and some with none, but no one can live without a certain amount of kidney'.

CHOICE OF PROCEDURE

There are various alternatives open to the surgeon when faced with this accident, and it is very desirable that a surgeon who is exposed to the risk of injuring the ureter should be prepared at once to repair the damage. He may attempt end-to-end union or he may graft the ureter into the bladder or into the colon. This last procedure would only be permissible if the injury were high up and a portion of the ureter had been removed. Fortunately, the injury when it occurs is nearly always quite near the vesical end of the ureter. End-to-end union is far from satisfactory. Only when the conditions are very favourable can a satisfactory union be made between the divided ends of the ureter. Moreover, should any narrowing occur it would not be so easily recognized or corrected as in the case of a graft into the bladder. I do not hesitate to say that the surgeon's duty is to implant the divided end of the ureter into the bladder. Great care is required in the performance of this operation, for if plenty of room is not left for the implanted ureter it may become sclerosed by chronic ureteritis which may narrow and even obliterate its lumen. The narrowing may be a gradual process and the obstruction to the ureter may lead to serious hydronephrosis or pyonephrosis after an interval of years.

This risk of narrowing can be avoided or minimized by careful attention to detail. In the first place a useful little manoeuvre is to pass long fine forceps along the urethra and make them protrude on to a selected spot on the posterior wall of the bladder. A small incision

is made on to the end of the forceps and the ureter drawn into the bladder by a thread which has been attached to it. The ureter can then be sutured to the bladder wall outside and a water-tight junction established. This method of grafting is not so certain of success as making the junction from inside the bladder. The surgeon need not hesitate to open the bladder during the course of an intraperitoneal operation.

If the bladder is opened and the ureter stitched in place from inside the viscus plenty of room can be left for the graft by leaving a gap below the suture line and passing a small drainage-tube through the posterior wall of the bladder into the retro-vesical tissues. The site of entry of the graft on the outside of the bladder can then be made extraperitoneal by suturing the pelvic peritoneum carefully over it.

If the bladder is not opened at the time and the implantation of the proximal end of the ureter is completed from outside the bladder the graft must generally be so closely sutured in position in order to make the junction absolutely water-tight that it is liable to become narrowed. If the implantation has been carried out in this way the graft should be kept under observation for some months and the opening of the ureter examined at intervals through a cystoscope. In this way any threatened contraction of the orifice, with the danger of damage to the kidney by obstruction and consequent increased risk of infection, can be recognized and dealt with either by dilating the orifice or, if necessary, by opening the bladder and improving the graft.

The surgeon may be labouring under the handicap that he is reluctant to call attention to the accident, but the interests of the patient demand that the graft should be kept under observation, and therefore the position must be faced and explained.

Treatment of uretero-vaginal fistula

I now pass to a discussion of the treatment of uretero-vaginal fistula. This may develop if the ureter has been cut and the injury has not been repaired, or if the blood supply of the ureter has been so interfered with as to lead to sloughing of the lower end, or if the ureter or part of it has been included in a ligature or suture.

When it is noticed that there is a leakage of urine from a vagina the surgeon has first to ascertain from what part of the urinary tract the leakage is taking place.

First of all he must satisfy himself that the urine is not coming from the bladder. This is not so easy as one might expect. By careful observation and by the injection of coloured fluids into the bladder and ascertaining if any of the fluid finds its way into the vagina this point is however eventually cleared up. Being satisfied that the leakage is not from the bladder the surgeon must next ascertain from which ureter the urine is escaping. Fortunately he may easily get a very helpful clue to guide him in this investigation, for cystoscopy and the passage of a ureteral catheter may soon reveal the side on which the injury has been inflicted. The injured ureter is always obstructed whether it be completely divided or not. There is always obstruction to the passage of a catheter on the side of the fistula if it has been present a few weeks. This clue generally leads quickly to a definite diagnosis in cases following hysterectomy for fibroids, but in cases following Wertheim's operation the position is complicated by the fact that both ureters have been so disturbed and are embedded in such dense scar tissue on the floor of the pelvis that it is often difficult to pass a catheter into either ureter.

Eventually however—perhaps only after several attempts and with the use of very rigid ureteral catheters or bougies, reinforced with metal—a passage is found up one ureter while the other is found to be impassable. The side on which the obstructed ureter is found indicates the side on which the fistula is present.

In spite of the difficulties we may have to contend with in order to be absolutely sure on which side the lesion is situated, we are indeed fortunate compared with our forbears. A reference to Sir Henry Morris's Hunterian lectures delivered at the Royal College of Surgeons a short 36 years ago makes one realize the great advantages under which we work to-day. At that time it was computed that in any hundred hysterectomies, vaginal and abdominal, one or both ureters were tied or cut across in at least three. And Spencer Wells in 1881 stated that out of 94 published abdominal hysterectomies one ureter had been divided in six, and both ureters in two other cases. For these injuries nephrectomy was performed and in many instances healthy kidneys were removed. It would be bad enough to be misled as to the injured side at the present day and to proceed to expose the wrong ureter, but how tragic it must have been in the days of which Morris spoke, when nephrectomy was the accepted remedy and there were not the same facilities for diagnosis that we possess to-day.

In speaking of the difficulties experienced by surgeons trying to identify the kidney which was in connection with the fistula Morris reported the following case:—

'A woman who had undergone vaginal hysterectomy by a distinguished gynaecologist recovered with an uretero-vaginal fistula. The patient was handed over to a distinguished general surgeon to be cured of this fistula. Efforts were made in a most careful manner to ascertain which ureter it was which had been wounded and become entangled in the vaginal cicatrix. These failing to afford definite information, the ureter of the suspected kidney was exposed through a lumbar incision and was temporarily ligatured. During this experiment, which was of course made under chloroform, no urine escaped by the vagina, but a certain amount was withdrawn by catheter from the bladder at the expiration of a given time. The inference was that the ureter temporarily ligatured was the one involved in the vaginal fistula; so the corresponding kidney was there and then excised. Imagine the surgeon's chagrin, and the patient's distress, the next day when it was discovered that, though she had lost a healthy kidney, the operation had not cured her of the fistula; for the wrong organ had been removed'.

Having ascertained which side is affected what should be done next? In three out of my 23 cases I have had the good fortune to force a catheter up an obstructed ureter with removal of the obstruction, followed by closing of the fistula. This experience leads me to recommend that serious efforts should always first be made to dilate the obstructed ureter through the cystoscope if exploration gives the least sense of the ureteral catheter or bougie being engaged in a stricture. The surgeon may notice after prolonged efforts, perhaps with a ureteral bougie or catheter which has been made more rigid by metal being interwoven in its structure, that the instrument is not easily withdrawn, giving the same sensation as that experienced when a gum-elastic bougie has become firmly engaged in a urethral stricture but has not passed through it. Further efforts may result in the passing of the catheter and cure may be expected.

If disappointment attend these attempts then the bladder should be opened.

The best results are to be obtained by resecting the lower end of the ureter through the bladder up to the site of the fistula and suturing the ureter into the bladder at a point above the fistula. The great advantage of an approach through the bladder is that, when the implantation is made, ample room can be left for the grafted ureter and all danger of the development of a narrow orifice avoided. On opening the bladder the previous observations are confirmed by passing a catheter up the intact ureter. A catheter is then passed on the fistulous side up to the site of obstruction. An incision is then made round the lower edge of the ureteral orifice and continued up the bladder wall. The lower end of the ureter is identified and dissected up until the fistula is reached. The lower part of the

ureter, including the fistula, is then cut off and the divided end of the ureter is loosely sutured into the base of the bladder. A small drainage-tube is passed through the bladder wall below the implanted ureter into the retro-vesical tissues and fixed in position by a catgut suture, and a catheter is left in the ureter. The rest of the wound in the base of the bladder is closed and the bladder is drained through the suprapubic wound. The small tube draining the retro-vesical space is brought through the suprapubic wound and the ureteral catheter through the urethra. The ureteral catheter is removed in two days' time. The small tube is removed as soon as it becomes loose, and the bladder tube at the same time.

Convalescence is usually uneventful and the result a perfect and permanent cure. The operation is one of some delicacy and difficulty and takes some time to perform. It is more tiring and exhausting for the surgeon than for the patient, for in spite of the time it takes to complete the operation it is not associated with any shock.

This is what I consider the ideal way of dealing with these cases and in my opinion it should always be attempted. Sometimes it cannot be accomplished. This is more likely in the cases resulting from Wertheim's operation. After Wertheim's operation an incision through the base of the bladder leads into dense fibrous scar tissue in which it is always difficult and sometimes impossible to identify the ureter. If the surgeon fails to dissect out the ureter he should not hesitate to open the peritoneal cavity. He can then trace the ureter down to the floor of the pelvis and draw the lower end into the bladder through an incision in its posterior wall placed as low down as possible. It is helpful to attach a thread to the lower end of the ureter to assist in pulling it through into the bladder. The peritoneum over the pelvic floor should then be carefully sutured and the peritoneal cavity closed. The surgeon can then proceed to deal with the implantation of the ureter from inside the bladder as already described.

In some cases when the ureter is isolated it is found to be dilated. This need not deter the surgeon from proceeding with the implantation provided the patient has not shown symptoms of severe kidney infection. Unfortunately the patient may not reach the surgeon until signs and symptoms of renal infection are well marked—pyuria, pyrexia, and pyelonephritis, and perhaps pyonephrosis. In such cases nephrectomy is indicated unless symptoms subside rapidly under treatment with urinary antiseptics.

In four of my cases the kidney has had to be removed because pyonephrosis had developed. It has been indeed a Delian sacrifice and has led me to urge that these cases should be dealt with early, when there is much more likelihood that success will follow attempts at catheterizing the ureter; operation, if necessary, will be easier than at a later date and the kidney will probably be saved. I have been able to pass a ureteral catheter on one patient comparatively easily when the fistula had only been present for a week and my colleague, Mr. E. W. Riches, has had a similar experience. Cure followed in both cases, though perhaps cure should not be attributed solely to this intervention as the leakage is sometimes only temporary. I have already mentioned cases in which I was successful in this manner and in one of these it was several weeks after Wertheim's operation. I still think, however, that the sooner the attempt is made after the development of the fistula the more likely it is to be successful. If the attempts to pass a ureteral catheter fail, operation for implantation of the ureter should not be proceeded with at once as the leakage may cease spontaneously, but operation should not be delayed more than a few weeks.

Conclusions

My experience leads me to the following conclusions:
1. All uretero-vaginal fistulae should be dealt with as soon as possible after being diagnosed. 2. In the

first place prolonged and even repeated attempts should be made to catheterize the ureters. 3. On the injured side obstruction is always found to the passage of the ureteral catheter when the fistula has been present for any length of time. 4. If catheterization fails the implantation of the proximal end of the ureter into the base of the bladder by an intravesical operation gives the best prospect of cure. 5. This implantation can be successfully carried out if the case is seen early, but after Wertheim's operation it becomes increasingly difficult as time passes and dense scar tissue develops. 6. In the event of failure to complete the graft by an intravesical operation the peritoneal cavity should be opened, the ureter isolated, and the grafting operation begun from outside and completed from inside the bladder. 7. In seriously infected cases the best procedure is nephrectomy through a lumbar incision.

The cure of this unfortunate disability may require all the skill, patience, tact, and determination to succeed with which the surgeon may be endowed. When success attends his efforts he will receive deep gratitude from the patient who has been relieved of a condition which was making life almost unbearable. If the surgeon has succeeded in curing the patient without the loss of a kidney he will in addition have the satisfaction of knowing that he has left her not only relieved of her distress but still endowed with her full renal efficiency.

Treatment of Puerperal Fever by Antistreptococcal Serum

By LEONARD COLEBROOK, M.B. (Lond.)

(From the *Lancet*, 11th May, 1935, Vol. I, p. 1035)

FOR 40 years antistreptococcal sera have been undergoing clinical trial all over the world for the treatment of puerperal fever. They are still very extensively used, but no agreement has been reached by clinicians as to their value. Most observers have seen the occasional patient whose temperature dropped in dramatic fashion following the administration of antistreptococcal serum (possibly a 'protein shock' effect, since this has sometimes happened with an infection which was not due to streptococcus); much more often they have seen the fever remit for a few hours only and the disease continue as before. It is not difficult to understand these discordant results and the many undoubted failures of serum therapy. The term 'puerperal fever' covers a very wide range of pathological conditions—from localized infections of the genital tract, parametric cellulitis, and thrombophlebitis, to generalized peritonitis, 'septicæmia' with or without metastatic foci, and endocarditis.

Critical judgment of the effect of any treatment will of necessity be very difficult in many of these conditions, for some of them—e.g., the infections which remain localized to the genital tract—carry a very high spontaneous recovery rate (nearly 100 per cent); while in others—e.g., fully generalized peritonitis and endocarditis—it is hardly to be expected that any therapeutic agent could overtake the infection. Moreover, these varied pathological conditions are now known to be produced by very different microbes. The hæmolytic streptococcus is responsible for about half of them; anaerobic and other types of non-hæmolytic streptococci, *B. coli*, staphylococcus, and other organisms are responsible for the rest. There is no doubt that during all these 40 years antistreptococcal sera have very often been employed in circumstances which did not allow of a specific curative effect.

The sera themselves have varied considerably. For about 30 years following Marmorek's work (1895) most workers aimed at producing a serum which was primarily antibacterial—i.e., one which would control the invasion of the tissues by the cocci. The possibility—and desirability—of producing an antitoxic serum was, however, not lost sight of (Marmorek,

Aronson, 1902), but the earlier attempts in this direction were not very successful. Since the war recognition of the fact that an exotoxin of the hæmolytic streptococcus ('Dick toxin') is produced in the human body—during scarlet fever, at any rate—and that this exotoxin can be neutralized, both *in vitro* and *in vivo*, by a highly antitoxic serum, has stimulated the hope that better therapeutic and prophylactic results might be achieved by such a serum than had been obtained with the antibacterial sera. The selection of good toxin-producing strains of streptococci for the immunization of the horses, and the improvement of technical methods for the concentration of the antitoxic fraction of the serum, have given us sera of much greater potency than those of earlier days, and these sera have been extensively employed in the treatment of puerperal fever for the past ten years. Many reports of individual cases, or of very small series, have been published, but these are of very little evidential value. On a broad view it may be said that those who have had most experience have been least convinced as to the efficacy of these sera. An analysis of a large series of cases, treated and untreated, by Benson and Rankin will be referred to later.

On the hypothesis that the toxins of puerperal fever strains might differ somewhat from those of scarlet fever, some laboratories have prepared sera from toxigenic puerperal fever strains.

Warnekros, Louros, and Becker reported 200 cases of puerperal fever treated with such a serum without a death. The cases are described as severe (*schwere*) but the clinical data given are extremely scanty. We are not told whether there were any cases of peritonitis nor how many of septicæmia (hæmolytic streptococci in blood culture); nor indeed how many cases were infected by that microbe. Nor is there any estimate of the recovery rate in a comparable series of unselected cases not treated by serum. From the fact that 4 of the 6 patients whose temperature charts are reproduced (presumably among the most severe) are stated to have had no microbes in the blood, while the 2 remaining cases grew respectively three and five colonies from the blood, it seems probable that a large proportion of the cases presented merely a localized infection which normally carries a recovery rate of approximately 100 per cent.

In 1928 Gaessler reported a further 400 cases from the same clinic with 20 deaths; 299 of his cases were admitted with little or no fever on account of difficult labours but subsequently became more or less febrile. In this series, as in the former, there was no distinction between cases infected by hæmolytic streptococci and those which were not, and the very meagre clinical data do not permit of any judgment as to the effects of the serum. Later reports do not seem to support these first claims to success.

Still more unsatisfactory as a statistical study is the analysis by Lash (1929) of 57 cases treated with a similar serum made from puerperal fever strains. The death rate among these cases was 32 per cent, but this compared favourably with that of a control group (treated in other ways) of 13 selected cases which showed a death rate of 61 per cent. Fortunately details are given of these control cases, and it is seen that they comprise 8 cases of septicæmia and 7 of 'peritonitis or beginning peritonitis'—scarcely a representative sample of ordinary puerperal infections.

In 1929 H. Vincent introduced a 'new' serum which has been extensively used in France. The method of its manufacture has not been disclosed, but there seems no reason to suppose that it rests on any new principle. No evidence has been given that it can either prevent or cure an infection by hæmolytic streptococci in animals, but in a recent paper Vincent (1934) has claimed that by the use of enormous doses (1,300 c.cm. in one child) no less than 180 (82.5 per cent) of a series of 218 cases classed as 'septicæmia and meningitis' have been cured. This remarkable claim demands careful examination. Such examination shows that there has not been personal observation of

the cases. They have been collected from the numerous published reports of the medical press of France and other countries and of reports of cases sent to him privately. The published reports deal almost invariably with one or occasionally two cases of recovery, and they attribute that recovery unequivocally to the serum even when many large doses were required before the temperature fell. Frequently other forms of treatment were employed at the same time. These individual case reports tell us nothing at all about other cases treated who have not recovered.

In assessing the value of such evidence I think one should not forget that many medical men will publish individual successes while few will broadcast failures. It might well be that if *all* the cases of 'septicæmia and meningitis' treated by this serum were faithfully recorded the result would be very different. Again, there is some doubt as to the sense in which Vincent uses the words 'septicæmia and meningitis'. He does not tell us categorically in how many cases hæmolytic streptococci were grown from the blood, nor in how many from the cerebro-spinal fluid, but he does mention in a footnote that some cases were included although their blood culture was negative. His claim that the recovery of the 180 cases was due to serum and not to 'natural causes' appears to rest, however, on the summary statement that '*Le septicémie à streptocoques comporte un pronostic fatal*' (1929).

That statement does not agree with my personal experience of hæmolytic streptococcal septicæmia (with positive blood culture). With Dr. R. Hare I have reported (1934) 19 such cases (excluding cases of generalized peritonitis) observed during the years 1928-33 which showed a recovery rate of 41 per cent; and in a further series of 15 such cases observed during 1934 at Queen Charlotte's Hospital no less than 11 have recovered (73.3 per cent). Seven of these 15 cases gave a positive blood culture on more than one occasion, and five of the seven recovered. In none of these cases was specific treatment used. The recovery rate of 73 per cent is probably quite unusual, but it serves to show how cautious one should be in attributing recovery in septicæmia to any particular remedy.

My impression after a careful study of these clinical reports—and of many which preceded them—is that none of them justify the conviction that antistreptococcal sera have really shown an indubitable effect upon the puerperal infections by hæmolytic streptococci. (I am purposely excluding scarlet fever from this survey, partly because I have no experience of it, and also because the rationale of treatment by an antitoxic serum in that disease is on quite a different footing.) If such a curative effect is to be clearly demonstrated in the human subject, it must be by application of the treatment to large groups of cases known to be infected by hæmolytic streptococci, and by critical comparison of their records with those of cases similarly infected but untreated. Both groups must be under the direct observation of the same individuals and the bacteriological data should be obtained in the same laboratory.

Investigations of this kind carried out for the first time during the last few years will now be described.

Benson and Rankin (1933) have reported upon 114 puerperal cases observed in Edinburgh. Half of them had received serum and half had not. The two groups comprise all the cases from whom a positive blood culture (hæmolytic streptococcus) was obtained during a period of several years. (It is important to note, however, that many of the serum-treated cases were only found to be 'blood positive' at some period *after* the commencement of serum treatment.—Personal communication from Dr. Benson.) In 28 per cent of them the treatment was commenced within 48 hours of the onset of fever. Of the 57 serum-treated cases 37 received scarlet fever antitoxin and 20 'puerperal antistreptococcus serum' (which also contained some antitoxin). The authors state that both sera were manufactured by Messrs. Burroughs Wellcome and Co.

In 74 per cent of the cases the serum was given intravenously as the makers recommend. The mortality rate in the 57 serum-treated cases was 75 per cent as compared with 68 per cent in the control group. In view of the 'several days of misery in the form of serum sickness', the great expense (nearly £300 for the 57 patients) and the absence of any evidence that the treatment had any beneficial effect, the authors recommend that the giving of serum '*faute de mieux*' ought to be discontinued.

EXPERIENCE OF SERUM-TREATED CASES AT QUEEN CHARLOTTE'S HOSPITAL

Comparison of 69 cases treated with antistreptococcal or antiscarlatinal (antitoxic) serum before admission to Queen Charlotte's Hospital with other cases not so treated (1930-34).

CASES TREATED BY SERUM

Infected by hæmolytic streptococci 40 (58 per cent)
Not infected by hæmolytic streptococci 29 (42 " ")

ALL CASES OF PUERPERAL PYREXIA ADMITTED TO HOSPITAL

Infected by hæmolytic streptococci 60.8 per cent
Not infected by hæmolytic streptococci 39.2 " "

DEATH RATE OF THE SERUM-TREATED CASES AND OF THE CASES WHO HAD NO SERUM

	Cases	Deaths	Case mortality (per cent)
All cases treated with serum before admission ..	69	21	30.4
All cases who had no serum	932	108	11.6
Hæmolytic streptococcus cases—			
Treated with serum ..	40	18	45.0
Treated without serum	346	70	22.3

Antistreptococcal sera have not been used at the Isolation Block of Queen Charlotte's, but 69 cases during the last four years had been given serum before admission. Most of them were sent in by private doctors and they came from all parts of the Greater London area.

Certain data obtained from the records of these 69 cases—and of the cases who received no serum—are shown in the table.

COMMENTS ON THE TABLE

(1) It is unfortunately not possible to give complete and entirely reliable data as to the exact kind of serum used in every case, its amount, or the route by which it was administered, because there was often difficulty in getting all these details from the doctor who sent in the case. So far as the records serve they show that the serum was always derived from laboratories of good repute, that 39 cases got 'antistreptococcal serum' and 30 scarlatinal (antitoxic, concentrated) serum. One case had both. Thirteen cases had more than one dose. The amount of serum varied from 10 c.cm. to 140 c.cm. In most of the cases it was given intramuscularly.

(2) Since the 69 cases were treated by serum before admission to the hospital it is not possible to describe their condition at the time when the treatment was begun. In about 75 per cent of the cases the first injection was given within 48 hours after the onset of fever—often within 24 hours. After admission to the hospital all cases were treated on precisely the same lines. Glycerine was usually instilled into the uterus several times daily for the first few days and the

patient's strength maintained by good feeding and nursing. In the great majority no specific treatment of any kind was used.

(3) It will be seen that over 40 per cent of the cases treated by serum were not infected by hæmolytic streptococci and were therefore subjected to the risk of serum sickness without any prospect of a specific immunizing effect.

(4) The mortality rates for the 69 cases treated by serum and for all cases who had no serum show a very big difference, but it would be a mistake to attach much importance to this, because these two groups are obviously unsatisfactory statistical material. Both include many cases not infected by hæmolytic streptococci and also a certain proportion of cases in which the fever was really of extragenital origin—*e.g.*, cases of urinary infection, mastitis, bronchitis, and so forth. It is of interest to note in passing, however, that an examination of the published records of similar unselected cases of puerperal infection by a committee of the American Gynecological Society in the early days of serum treatment (1899) gave very similar figures: 352 serum-treated cases showed a mortality three to four times as high as 138 cases which had no serum. The committee rightly recognized that the data were not entirely reliable and did not therefore permit of a very emphatic statement of conclusions. Nevertheless it ventured the opinion that more patients were dying from the treatment than from the disease.

(5) The figures that merit most consideration are, of course, those showing the mortality rates in the two groups infected by hæmolytic streptococci. Clearly it is difficult to deduce from them that the treatment by serum had any beneficial influence upon the infections—and this in spite of the fact that in 75 per cent of the cases serum was given within 48 hours of the onset of fever—often indeed within 24 hours.

The important question remains. Did the serum actually, as the figures suggest, contribute to the unusually high death rate among the 40 cases? This is such a serious issue that the data demand the most critical scrutiny.

I have considered the following possible sources of fallacy:—

(a) *That serum was given only to the cases who seemed most gravely ill.*—This consideration may well have been operative in a small number of the cases but not, I think, in a large proportion of them. My reason for that opinion is as follows: it is well recognized by all who have much experience of puerperal fever that the cases most gravely ill during the first week are those infected by hæmolytic streptococci. If serum had been reserved for these most severe cases one would expect to find a very high percentage (not less than 80 per cent) of infections by hæmolytic streptococci among the 69 cases so treated. But only 58 per cent were so infected—a figure actually a little lower than that for all cases admitted to the hospital. No less than 29 of the 69 cases, although they were given serum, had not an infection by hæmolytic streptococcus, and, as is usual in such cases, these 29 cases carried a low mortality rate (10 per cent). Moreover, a survey of the records of the 40 hæmolytic streptococcus cases treated by serum shows quite clearly that many of them were never gravely ill.

In my opinion therefore we must conclude that the whole 69 serum-treated cases represent just an average sample of febrile disturbances in the puerperium; and that most of them were given serum because they happened to be in the care of a medical man who believed that as soon as a woman developed fever in the puerperium it was best to employ that remedy. Even, however, if we suppose that 5 of the 40 hæmolytic streptococcus cases were given serum because the clinical condition was judged to be unusually serious, and that all the 5 died, there still remains a mortality rate of 37 per cent for the other cases whose selection was probably not determined by this special consideration.

(b) *That the 40 serum-treated cases were admitted on the average somewhat later than those who had no*

serum—and for that reason did not gain such benefit as may accrue from the routine treatment and specialist care in this hospital.—It has been our experience that early admission—particularly of the cases infected by hæmolytic streptococci—is definitely correlated with a high recovery rate. On working out the time of admission of the serum-treated and other cases, however, it does not appear that this consideration can have influenced the mortality rates shown in the table. The 69 serum-treated cases were admitted on the average 7.8 days after labour; the 40 hæmolytic streptococcus cases 8.0 days; the 18 fatal hæmolytic streptococcus cases 7.8 days; and 76 control cases, consisting of 19 consecutive cases chosen at random from each of the four years, 7.8 days.

(c) *That many of the infections among the 40 serum-treated cases had occurred in epidemics or during periods when the prevalent infections were of an unusually severe type.*—Actually only 4 of the 40 serum-treated cases originated in small epidemics (and 2 of them recovered). Both serum-treated and control groups were made up chiefly of sporadic cases spread over the four years. The mortality rate among the 346 cases infected by hæmolytic streptococci never rose above 28 per cent for any one year.

My opinion, after all consideration of these possible fallacies, is that the greatly increased mortality rate in the serum-treated cases was due either to the serum having exerted an unfavourable effect—turning the scale against their recovery—or to the operations of chance. Choice between these alternatives is not easy. On the one hand, it is obvious that very many and very large doses of serum have been repeatedly given to human beings without apparent harm. On the other hand, evidence is not lacking which indicates that the injection of a foreign serum may sometimes be definitely prejudicial to infected human beings and animals. A. Jousset (1924) and P. Courmont (1934) have emphasized these adverse effects in connection with experimental tuberculosis (guinea-pigs) and with phthisis in man.

The most striking evidence relating to streptococcal infections is that of Penfold and Butler (1932), who observed that both normal horse serum and anti-streptococcal sera, given to mice at the same time as a dose of living streptococci, would sometimes hasten the death of the animals. The conditions in the infected human subject under treatment by serum are admittedly quite different from those of the mouse experiments and it does not therefore follow that the therapeutic sera will necessarily exert a similar effect in the two cases, but, until we have more understanding of the mechanisms involved, that possibility cannot be ignored. Pointing in the same direction is the recent warning by B. Schlesinger (1935) against the danger of giving antistreptococcal sera to children with acute rheumatism which in his experience is not infrequently 'reactivated' by such treatment.

All this evidence, taken together with the well-known, but little understood, 'toxic' effects of horse serum, ought, I think, to be taken into account before we subscribe to the dictum so often expressed that 'a dose of serum can at any rate do no harm'. Can we be sure that an agent capable of causing such profound disturbances as those associated with anaphylaxis, serum sickness, and agglutination of red corpuscles (the extreme degree of incompatibility between horse serum and human reds does not seem to have been generally recognized), will not sometimes have an adverse effect upon the complex mechanisms concerned in immunity to infective diseases? I would suggest that our view of serum therapy has in the past been somewhat unbalanced. We have focused attention too exclusively upon its antitoxic or antibacterial qualities and rather lost sight of the 'toxic' potentialities which have to be set off against them. The possible benefits of passive immunization probably must always be paid for. Sometimes, as in the case of diphtheria antitoxin, the price may be well worth while—in other cases, as

perhaps in the case of antistreptococcal serum, it may be too heavy.

At Queen Charlotte's, if we had given serum to all cases infected by hæmolytic streptococci, and if they had had the same death rate as in the 40 cases so treated before admission (*vide* table), there would have been approximately 86 more deaths than actually occurred during the years 1930-34.

It would not be profitable to set out in full the results of a critical survey of all the experimental work published in connection with antistreptococcal serum, because so many points are left in doubt and require reinvestigation in the light of new knowledge about the group of hæmolytic streptococci. The following brief summary and references may, however, be useful:—

PROTECTION EXPERIMENTS

(1) By the immunization of horses, rabbits, and sheep, sera have been obtained which, when given some hours in advance of the infecting dose, would protect mice and rabbits against 1,000-100,000 M.L.D. of the strain used for immunization (Marmorek, Bordet, Aronson, Neufeld, Simon, Dochez, Avery, Lancefield, Yoshioka, Lancefield and Todd).

(2) It appears that these highly effective sera have only been produced with streptococcal strains of exceptional virulence, resulting from frequent passage through animals.

(3) Some of these protective sera were more active against other strains of hæmolytic streptococci than that used for the immunization of the horses [Sommerfeld, Neufeld (1903), Simon]; and it is possible (although not proven) that these other strains were sometimes of different serological type. On the other hand, the work of Dochez, Avery and Lancefield strongly suggests that the protection afforded by such sera is strictly type specific.

(4) It is not clear that the protective sera thus obtained by immunization with highly virulent 'passage strains' have ever been effective strains of moderate or low virulence such as are habitually isolated from human infections—e.g., puerperal fever, surgical sepsis, etc.

(5) The mechanism of protection by the highly active sera has not been adequately established, but the work of Bordet, and particularly that of Neufeld and Rimpau, seems to show that their capacity to render the very virulent streptococci susceptible to phagocytosis ('bacteriotropin effect') is a very important factor.

(6) Sera produced by the injection of toxigenic cultures of hæmolytic streptococci, or by filtrates of such cultures, into animals, are capable of neutralizing that toxin both *in vitro* and *in vivo* (Parish and Okell, Hartley, Pulvertaft). When a potent antitoxic serum is injected into rabbits in advance of a large dose of an avirulent culture containing such toxin, the life of the animals is prolonged, or sometimes saved (by virtue of the neutralization of the toxin), but infection of the tissues is not prevented (Parish and Okell). [It may be mentioned also that the active immunization of human beings by Dick toxin does not render them immune to infections by hæmolytic streptococci—as judged by the incidence of tonsillitis among the immunized staffs of fever hospitals (Benson and Rankin, 1934)].

(7) The commercial sera issued in recent years have at best only a very slight protective action against hæmolytic streptococci freshly isolated from acute septic infections of man even when they are given some hours in advance of the infection. When given at the same time as the infecting dose of streptococci they occasionally prolong the life of the test animals by a few days, more often they show no effect at all, and sometimes they definitely hasten death (Penfold and Butler).

CURATIVE EXPERIMENTS

Besredka (1904) and Aronson (1905) record that a highly protective serum obtained by the immunization

of horses with a very virulent 'passage strain' was able to overtake a rapidly fatal septicemic infection of mice if it was given within 12-24 hours after the infecting dose of homologous culture. Repetition of the serum dose was sometimes necessary. Besredka's statement is the more precise. He says that 1/40-1/100 c.c.m. of serum would suffice to save mice infected 18-24 hours previously with 2,000 M.L.D. of culture.

I have failed to find evidence that the commercial sera now available have the *slightest* curative effect in infected animals.

In vitro EXPERIMENTS

The antistreptococcal and antitoxic sera at present available have not been shown to possess any bactericidal power. Hæmolytic streptococci will grow in them. Nor have these sera any power to promote the phagocytosis of virulent streptococci (bacteriotropin effect) (R. Hare).

I believe it is correct to say that most of the laboratories producing these sera do not test them at all for any antibacterial (as opposed to antitoxic) properties.

Conclusions

1. There is no trustworthy clinical evidence that the administration of antistreptococcal serum for the treatment of human infections by hæmolytic streptococci has had any specific curative effect. (A possible effect on the toxic manifestations of scarlet fever is purposely excluded from this statement.)

2. The evidence obtained in puerperal fever cases at Queen Charlotte's Hospital suggests that such administration may sometimes have an *unfavourable effect* upon puerperal infections by hæmolytic streptococci; and this impression is to some extent supported by the evidence of animal experiments. All our experience carries the lesson that it is in the best interest of the patient suffering from an infection by hæmolytic streptococci not to interfere with her immunizing mechanisms (about which we know so little as yet) until we can be sure that such interference does not do harm.

3. Although sera have been produced which would protect animals against infection by streptococci of artificially enhanced virulence, there is no satisfactory evidence that a serum has ever been produced which would afford more than very slight protection (occasionally) against hæmolytic streptococci freshly isolated from acute human infections and of various serological types.

4. Similarly there is no evidence that any antistreptococcal serum has ever exerted a *curative effect* in animals infected by such hæmolytic streptococci freshly isolated from human infections.

5. It is a matter for regret that antistreptococcal sera should have been issued for clinical trial so long before satisfactory experimental evidence as to their curative effects in animals was available—or a strong presumption existed (from unequivocal *in vitro* experiments) that such a curative effect would be obtained in man. Until our knowledge of immunization against the hæmolytic streptococci has progressed further it would seem desirable to discontinue the use of antistreptococcal sera in the treatment (and prophylaxis) of puerperal fever and 'surgical sepsis'.

Theories on the Genesis of Gastroduodenal Ulcer

(From the *Journal of the American Medical Association*, Vol. CIV, 4th May, 1935, p. 1637)

THE circulatory theory of the genesis of gastric ulcer advanced by Virchow and Hauser in 1853 suggested that such ulcers are produced by an infarction of a terminal blood vessel with consequent necrosis, the starting point for the digestive action of the gastric juice. In this theory the rôle of the excessive gastric secretion assumed especial importance and was considered the decisive factor by Riegel, Boas, Sippy, von Bergmann and, in fact, the majority of clinicians

Chronic ulcers, it was pointed out, occur only in that portion of the gastro-intestinal tract which is exposed to the action of the hydrochloric acid; *viz*, the stomach and the first two inches of the duodenum. They are rare in the cardia. When the jejunum is exposed to the action of gastric juice following a gastro-enterostomy for ulcer, marginal peptic ulcer develops not infrequently. However, such ulcer has never been observed when the gastro-enterostomy is performed for gastric cancer. Of particular interest are the peptic ulcers of Meckel's diverticulum, in which histologic studies revealed the presence of islands of gastric mucosa in the diverticulum. The ulcer itself is analogous to the marginal peptic ulcer. Ulceration here is ascribed to the peptic effect of the gastric juice on the adjacent intestinal mucosa.

The wave of enthusiasm for stomach resections, which began about twenty years ago and was advanced with particular fervour in Germany, supplied abundant material for histologic studies and a new point of view. In all cases of gastric or duodenal ulcer, gastritis or duodenitis appeared. The inflammatory areas frequently contained multiple small, oval, round and linear erosions, the largest of which could be recognized macroscopically as superficial erosions. The fact that he failed to find any change in the blood vessels in these areas was stressed by Konjetzny, who did not observe any evidence of hæmorrhage, anæmic necrosis or hæmorrhagic infarction. Inflammatory changes in the mucosa without any evidence of peptic digestion were, however, observed with great regularity. Konjetzny, Puhl, Moscovitz, Kalima and others, supported by histologic studies, established that ulcerative gastritis or duodenitis is the important factor in the pathogenesis of the ulcer disease. Inflammatory gastritis and duodenitis were the precursors as well as the accompanying anatomic factors and explained the chronic course of the disease with its remissions and exacerbations. These observers denied the importance of pepsin hydrochloric acid in the conversion of an erosion into an ulcer. The neurogenic-spasmogenic theory of von Bergmann was based on the clinical observation that many of the patients with ulcer exhibited disturbances of the vegetative nervous system. Eppinger and Hess suggested that vagotonia provoked spasms of the muscularis and of the muscularis mucosæ, leading to areas of ischæmia, which favoured the formation of erosions and ulcers. A spastic condition of neurogenic origin operating on the vessels and

the muscular apparatus was the causative factor. But experiments on severing the vagi and on extirpating the sympathetic and the celiac plexus gave contradictory results, and the hypothesis that all bearers of ulcer are vagotonic or sympathicotonic did not find acceptance.

The mechanical-functional theory advanced by the Aschoff school was based on the existence of a special anatomic unit. The gastric channel of Waldeyer, 'the magenstrasse', occupying the lesser curvature, is the seat of 90 per cent of all gastric ulcers. The contention that food and gastric juices move along this path to reach the pylorus, thus exposing it to greater mechanical and chemical injury than the rest of the gastric mucosa, is not supported by the more recent roentgenologic studies. The accumulated clinical and experimental observations force the clinician and the experimental worker once more to look to the digestive power of the gastric secretion as the most important factor in the genesis of the ulcer. The next step was an attempt to produce ulcers in normal gastric mucosa by increasing the amount of the secretion as well as its digestive power. Birkle-de la Camp was able to produce ulcers in rats by subjecting them to starvation and to hypodermic injections of histamine in doses sufficient to stimulate the secretion of the gastric juice but not sufficient to cause spasmodic contractions of the gastric vessels or the musculature. The ulcers thus produced exhibited a tendency to invasion, bleeding and perforation. These effects could be produced only in fasting stomachs; but fasting alone without injections of histamine failed to produce ulceration of the gastric mucosa. Sectioning of both vagi did not cause ulcer formation unless combined with histamine injections. The rôle of the gastric secretion in the genesis of ulcer was demonstrated even more strikingly in Silbermann's experiments. Silbermann established œsophageal fistulas in dogs and subjected them to sham feedings, thus stimulating the psychic phase of the gastric secretion. The stomach continued to secrete after each feeding a secretion of acid concentration and digestive power five times as great as that of the normal secretion. When examined from fourteen to forty-nine days later, all the dogs showed ulcerations in varying stages of development. Silbermann's experiments demonstrated that excessive gastric secretion of high digestive power is capable of producing severe gastric lesions and fibrinoid necrosis and that the experimental ulcers are localized almost exclusively in the pyloric region.

Reviews

THE AUTONOMIC NERVOUS SYSTEM.—By A. Kuntz, Ph.D., M.D. Second Edition. 1934. Baillière, Tindall and Cox, London. Pp. 697. Illustrated with 73 engravings. Price, 35s.

As far as medical science is concerned it is a fairly general rule that the less known about a subject the more voluminous the literature. This volume is certainly large and although a really satisfactory theory of the exact nature and significance of the autonomic nervous system has yet to be advanced, the author has made an exceedingly good survey of the field. He has covered the anatomical, experimental, clinical and theoretical sides and despite our ignorance has brought forth a considerable amount of both useful and interesting information. The anatomy, histology and embryology is described in detail in the beginning followed by a chapter on the pharmacology of the autonomic nervous system. Probably in no branch of physiology has pharmacology proved such a useful handmaid in the elucidation of function as in this field. The autonomic innervation and in certain cases cortical representation of every part of the organism is taken up along with a discussion based on experimental and

clinical data of its function in each particular instance. The theory of autonomic balance and imbalance is then discussed. There can be no doubt about the fact that the true sympathetic system (the chain of ganglia and nerve offshoots connected to the cord from the second thoracic to the fifth lumbar vertebra) on the one hand and the parasympathetic system (cranial autonomic oculomotor VIIIth nerve—vagus and sacral branch—pelvic nerve) on the other are in general antagonistic in action on any particular system.

This fact led Eppinger and Hess in 1909 to put forward the conception of sympathicotonia and vagotonia based largely on clinical work.

Vagotonics showed in general a preponderance of vagal effects such as a slow heart, tendency to diarrhœa, dry skin, etc., while sympathicotonics were highly strung, tended to perspire easily and were subject to tachycardia. The theory is not complete however as most subjects showed features of both types of activity. Later workers however suggested that it is not a case of preponderance of one system but an enhanced activity or irritability or both. In Graves' disease for instance one sees tachycardia and perspiration along with diarrhœa significant of vagal overactivity.

Much remains to be done in this field but undoubtedly Eppinger and Hess expressed a fundamental truth. A number of clinical observations and surgical applications are given and the book should be a stimulant to an enthusiastic and observant clinician in any branch of medicine. Probably in no branch of physiology is more information to be obtained on this system than by careful observation of the human subject in health and disease. There can be no doubt that the influence of the mind on the body and *vice versa* must be effected through this system—a fact which possibly explains the conflicting or negative results often obtained by animal experiments in this field where the higher cerebral function is less in evidence. One omission might be mentioned, namely a discussion of the mechanism of humoral excitation, and the newer knowledge of adrenergic and cholinergic fibres. The recent knowledge of the effect of choline and adrenalin or adrenalin-like substances has done much to clear up some anomalies in the system based on anatomical and pharmacological evidence—namely the sweat glands which are anatomically pure sympathetic and yet respond to pilocarpine, a vagotonic drug. The book is well written and contains a full list of references.

H. E. C. W.

DIETETICS FOR THE CLINICIAN.—By M. A. Bridges, B.S., M.D., F.A.C.P. Second Edition. 1935. Henry Kimpton, London. Pp. xxiii plus 970. Price, 45s.

THE attainment of scientific and correct principles as regards the treatment of a disease is not confined to the drug therapy alone but a good deal of it lies in a proper and systematic adjustment of the diet. It is therefore gratifying to note that continued and increasing interest is being shown by present-day clinicians towards this important and hitherto neglected subject, which unfortunately in the past was left to the control of the housewife alone.

The marked improvement which is brought about by the dietetic management of a typhoid patient has been an eye-opener to many and even the die-hard old clinicians were not slow in recognizing its value. The change from the low (1,000 calories or less) to high caloric diet has now been welcomed by most clinicians as a valuable aid in the management of these cases.

The same remark applies to cases of tuberculosis, where, in addition to the high caloric diet, a diet rich in calcium and vitamin content is nowadays advocated, with gratifying results.

Then again, the value of ketogenic diet in certain types of epilepsy is steadily gaining ground.

The value of ketonuria as produced by diet on certain types of bacilluria is now almost established. It has been proved by experiment that urine with a pH value of 5.5 to 5.2 or less in conjunction with beta-hydroxy-butyric acid content of 0.5 per cent has a bactericidal action on certain types of colon bacilli.

This book contains a mine of useful information on the subject of diet therapy in different diseases and Dr. Bridges deserves the congratulation of the profession in bringing out the present edition based on sound and practical reasoning to account for the dietary advice he has given for different diseases and we feel no doubt that his book will be widely welcomed by the medical profession.

J. P. B.

THE KIDNEY IN HEALTH AND DISEASE.—Edited by H. Berglund, M.D., and G. Medes, Ph.D. 1935. Henry Kimpton, London. Pp. xix plus 754. Illustrated with 163 engravings. Price, 45s.

THIS book is the outgrowth of a symposium participated in by forty-one contributors, mostly American, though the senior author, Professor Berglund, is a Swede, formerly a professor of medicine in Minnesota.

The book abounds in references to the work of American, German and French investigators, but to relatively few British writers. This will probably tend

to diminish the interest of the British reader; though it must be admitted that it would be difficult to find a work as detailed and as comprehensive written by a British author on the kidney.

The first part of the book is concerned with the morphology of the kidney including comparative anatomy; the functions of the glomeruli and tubules in vertebrate and invertebrate animals is also dealt with. Particular attention is paid to the processes of filtration, reabsorption and glomerular blood flow.

Part II is concerned with the biochemistry of the kidney in health and disease; part III with the pathological and clinical aspects of the various forms of nephropathy, renal anomaly and renal infection, and also the relationship of the kidney to arterial hypertension.

Albuminuria and œdema are dealt with in part IV, ocular changes in part V, and the clinical aspects of Bright's disease in part VI.

The book is plentifully illustrated with excellent prints and diagrams. Relatively far greater attention is paid to morphology, biochemistry and pathology than to the clinical aspects, the symptomatology and the treatment of kidney diseases. Prognosis is almost entirely neglected.

The description of the pathology and bacteriology of kidney infections is detailed and extensive but the treatment of these conditions is very inadequately described. The symptomatology and treatment of hypertension is particularly sketchy though the description of the pathology of the condition is lucid and adequate; no mention has been made of the therapeutic use within recent years of muscle extracts, though the empiric use of magnesium sulphate in the hypertension of acute nephritis has been given a place. No treatment has been given for the most important condition of uræmia. In a book of this kind that is a serious deficiency—a description of the treatment of a condition like this is what the practitioner needs most of all. The scientific study of kidney function is very interesting, but a knowledge of the practical aspect of kidney disease is an infinitely more urgent need.

Notwithstanding these deficiencies the book is a very valuable one and one of the most extensive studies of this subject in the literature. The part of the book dealing with œdema is particularly good and the section on ophthalmoscopic appearances in kidney disease is very excellently described. The book is very readable and interesting.

T. H. T.

CHRONIC NASAL SINUSITIS AND ITS RELATION TO MENTAL DISORDER.—By F. A. Pickworth, B.Sc., M.B., B.S., A.I.C. (Exam.). 1935. H. K. Lewis and Company, London. Pp. xii plus 156 with 83 illustrations. Price, 16s.

THIS work is intended as a work of reference for those engaged in research work on mental diseases and so does not lend itself to an abstract.

To be appreciated it must be read in the original. The book is beautifully got up. All the illustrations are from original specimens. The reproductions are from untouched photographs. There are four sketches in colour by well-known medical artists and each is a work of art in itself.

The work originated when the author found sepsis in the sphenoidal sinus while he was investigating the histology of the pituitary gland of mental hospital patients. In this book he demonstrates the existence, extent and complications of chronic nasal sinusitis occurring in mental hospital patients. He also demonstrates the mechanisms by which such chronic disease results in those physical changes in the brain tissue which are present in cases showing symptoms of mental disorder.

In addition to his main thesis the author gives a practical clinical and pathological picture of mental disorder which is based upon functional changes of the cerebral capillaries.

He hopes that in future the clinician will try, at least, in his own mind, to correlate the symptoms of mental disorder with disturbed vascularity of the brain, and that the pathologist will associate his pathological, bacteriological and biochemical findings with their possible effect on the state of the brain capillaries.

The book will not only interest the specialist concerned but also the general practitioner as well.

Dr. Pickworth has made a contribution to the aetiology of mental disorder of the very highest importance. In support of this statement is the fact that nowadays all the large mental hospitals in Great Britain have an experienced rhinologist in their service.

H. S. C.

MODERN CLINICAL SYPHILOLOGY: DIAGNOSIS—TREATMENT—CASE STUDIES.—By John H. Stokes, M.D. Second Edition. 1935. W. B. Saunders Company, Philadelphia and London. Pp. 1400, with 973 illustrations. Price, 50s.

DR. STOKES and the other collaborators deserve to be highly congratulated for bringing out the second edition of their excellent and exhaustive book entitled *Modern Clinical Syphilology*. This edition consists of 24 chapters of 1400 pages and 973 illustrations, and deals with every aspect of syphilology in a clear and comprehensive manner. The medical student, the general practitioner, and the venereal specialist will all find the book equally interesting and instructive. Chapter I begins with a description of the spirochete and the pathological and immunological responses of the body to infection. Chapter II deals with the distribution of syphilis in the general population and the method of obtaining histories of cases. Chapter III, which is profusely illustrated, describes the method of examination of cases. Chapter IV describes the dark-field examination for spirochaetes in great detail and also the methods of staining spirochaetes. Chapter V deals with the serological tests on blood and spinal fluid and in it one finds many valuable practical hints on the Wassermann and flocculation tests. Chapters VI, VII and VIII are devoted to a general consideration of the principles in treatment and the uses of heavy metals and arsenicals. The subject is excellently dealt with. Chapter IX is devoted entirely to a description of various technical methods employed in treatment. Details regarding asepsis, preparation of drugs for intramuscular and intravenous injections, performance of lumbar and cisterna punctures and intraspinal medication are all given. Chapter X deals with the reactions and complications following treatment as well as contra-indications to treatment. This chapter will be found extremely helpful by the general practitioner. Chapter XI deals with some of the important problems connected with treatment of syphilis during latency and intercurrent disease and gives details regarding medicinal prophylaxis. Chapter XII deals with the clinical diagnosis of syphilitic chancre and chapter XIII with the manifestations of secondary syphilis and their diagnosis. Chapter XIV deals with relapse, reinfection and progress of early syphilis and chapter XV deals with the treatment of these conditions. Chapter XVI which is again profusely illustrated deals with late lesions of the skin and mucous membrane in syphilis and chapter XVII consists of a description of syphilitic lesions of the skeletal system. Chapter XVIII deals with syphilis of the gastro-intestinal tract and chapter XIX with syphilis of the liver and spleen. Chapter XX is devoted to cardio-vascular syphilis and chapter XXI to a consideration of syphilis of the nervous system. Chapter XXII deals with familial and congenital syphilis. Chapter XXIII deals with miscellaneous aspects such as syphilis of the lung and mediastinum, kidney, ureter, and bladder. The last chapter deals with the public health aspect of syphilis and includes a brief account of social service organization and sex problems. If one patiently goes through this voluminous book one is greatly impressed not only by the amount of information contained in it but also by the

soundness of the views expressed by the authors on controversial matters. It is an excellent reference book which should find a place in every important medical library. It is quite up to date and contains references to most of the recent work on the subject. The large number of illustrations and the synoptic tables in almost all the chapters are a special feature of the book and they greatly enhance its usefulness.

K. V. K.

A HANDBOOK OF MIDWIFERY—FOR OBSTETRIC DRESSERS, PUPIL MIDWIVES AND MIDWIVES.—By Sir C. Borkoley, M.A., M.C., M.D. (Cantab.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), M.M.S.A. (Hon.), F.C.O.G. Ninth Edition. 1935. Cassell and Company, Limited, London. Pp. x plus 634, with colour frontispiece and 76 illustrations in the text. Price, 8s.

SINCE this excellent handbook has now reached a ninth edition it needs no further commendation. Its qualities of conciseness, clear arrangement and good illustrations have made it a favourite book with midwives in England for three decades. The Indian midwife would appreciate it equally with her English colleague if there were a vernacular edition which she could use when preparing for her examination or when in search of a rapid reference. Notes on tropical anaemia of pregnancy, osteomalacia and the various tropical diseases associated with and influencing the course of pregnancy would be necessary in an Indian edition.

One hundred pages in a book of some 600 pages are devoted to the child. The teaching is dogmatic, feeding alternatives are rarely suggested and no distinction is apparently made between complementary and supplementary feeding. As the midwife may later become a health visitor it is unfortunate that her subsequent teaching may not always be in conformity with what she has been taught as a midwife. The need to limit the size of a handbook accounts for omissions and in the introduction the midwife is referred to the *Mothercraft Manual* to supplement her knowledge of the child.

J. M. O.

MEDICINE: DISEASES OF THE NERVOUS SYSTEM. Third Edition. Part V. (Catechism Series.) E. and S. Livingstone, Edinburgh. Pp. from 381 to 476. Price, 1s. 6d. Postage, 2d.

THE 'Catechism Series' is too well known to need an introduction. In a series of this kind it must be presumed that the student knows his anatomy and physiology of the nervous system, that he has read his textbooks and attended the lectures on nervous diseases. He would then find it useful for quick revision of the subject.

Although this is a revised and enlarged edition, one could not find the mention of 'convalescent serum' in the treatment of acute anterior poliomyelitis, 'lumbar puncture' in the treatment of cerebral haemorrhage and 'ketogenic diet' in the treatment of epilepsy.

The chief danger of these little books is that they encourage the habit of cramming.

R. N. C.

TEXTBOOK OF UROLOGY FOR STUDENTS AND PRACTITIONERS.—By D. N. Eisendrath and H. C. Rohnick, M.D. Third Edition. Revised. 1934. J. B. Lippincott Company, Philadelphia and London. Pp. x plus 942, with 700 black and white illustrations and 11 in colour. Price, 42s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 31-8

Docrans Eisendrath and Rohnick are both experts in urology, especially the former who is one of the most known American authorities in this branch of medical science.

It is therefore with great pleasure we welcome the appearance of the third edition of their book.

The first few chapters are devoted to the anatomy and physiology of the genito-urinary tract; laboratory—

methods anaesthesia and description of special instruments used in the treatment of urological conditions.

This part of the book then ends with a chapter on minor technique which contains many useful tips.

Veneral diseases come next and are well described. In the treatment of gonorrhoea, it is noteworthy that the authors do not place as much reliance on the efficacy of irrigation treatment of the urethra, as many surgeons have done in the past and continue to do. After the first few days they advocate the instillation of the silver preparations into the urethra by the patient himself, instead of irrigation.

The newer silver preparations such as neo-protosil, neo-reargon, lomosol, etc., are all described but the authors prefer to use silver nitrate, or argyrol, or protargol. Mercurochrome is stated to be useful in cystitis of non-gonococcal origin only.

Vasotomy and instillation into the vas of argyrol is warmly advocated in resistant cases of gonococcal vesiculitis.

There is an excellent chapter on senile hypertrophy and tumours of the prostate, and at the end of the book all the operative methods of dealing with the enlarged prostate are clearly set forth.

The remainder of the book describes in turn pathological conditions of the kidneys, ureters, bladder, etc., and the authors have found space to include histories and photographs of several interesting anomalies of these organs.

The book is well got up and printed: the coloured plates and photomicrographs being especially good.

Proper names, the commencement of paragraphs, and any sentences, or dicta, which are important, are printed in heavy block type as distinct from the ordinary type of the rest of the printing. This makes the book a little difficult to read, and is our only adverse criticism of an excellent volume.

H. E. M.

SURGICAL DISEASES OF THE CHEST.—By E. A. Graham, A.B., M.D., F.A.C.S., J. J. Singer, M.D., F.A.C.P., and H. C. Ballon, M.D., C.M., F.A.C.S. 1935. Henry Kimpton, London. Pp. 1070. Illustrated with 637 engravings. Price, 65s.

WHEREVER and whenever the subject of chest surgery is brought up the name of Dr. Graham comes instantly to the fore. He is the great pioneer of modern chest surgery, and now in conjunction with Drs. Singer and Ballon he has written a book which will certainly take its place in the forefront of the literature on this subject, and must be considered a classical work of reference.

It is not a volume on the 'surgery of the chest', but as the authors themselves state, it is written from the standpoint of 'the surgical diseases of the chest' which is a very different matter.

The earlier part of the book is devoted to the consideration of the physiology of the thoracic cavity, and the organs contained therein. This is well described and such questions as 'What happens when an open pneumothorax occurs' are clearly answered.

The bibliography is enormous, and the authors must be congratulated on the vast amount of work they have done in compiling it. The spelling of certain words varies in the text, but the reason for this is explained in the preface.

In a work of this nature which is excellent throughout, it seems invidious and it is truly difficult to single out individual chapters for particular mention, but those on the surgical treatment of angina pectoris, valvular heart disease, bronchiectasis, and tumours of the lung are worthy of special mention.

The good results claimed by some other surgeons, notably Hedblom, in the treatment of bronchiectasis by thoracoplasty, are not the experience of the authors of this book.

Whenever non-operative treatment does not effect a considerable amelioration of this condition, and operative interference is decided upon, the caustic pneumectomy of Graham is the method of choice. At

the end of the book there is an interesting description of the chest service section in the Barnes Hospital, St. Louis, Missouri.

The book is very well printed, but is large and extremely heavy, so we suggest for the consideration of the authors that future editions should be divided into two if not three volumes.

H. E. M.

A TEXTBOOK OF PATHOLOGY.—Edited by E. T. Bell, M.D. Second Edition. 1935. Henry Kimpton, London. Pp. 767, illustrated with 364 engravings and 2 coloured plates. Price, 37s. 6d.

IN the second edition of this book which has deservedly been well received by the medical profession the text has been thoroughly revised and brought abreast of current medical literature. The various topics are discussed more fully and a large amount of new material has been introduced. A new chapter on diseases of the bones and joints has been added and more references to the literature are given at the end of each section. These references are particularly useful in the selection of original articles in any particular subject in which the reader is interested. This is a remarkably useful publication, the pathology of each disease is fully described and an interest is maintained throughout in clinical conditions. Many excellent photographs and line drawings illuminate the text. Altogether this is the type of work which one would expect when each section is written by contributors who have made a special study of the subject and the whole book is so well edited that the subject becomes alive and interesting. It is a work we can confidently recommend to the medical student and medical practitioner.

C. L. P.

MEDICAL BACTERIOLOGY: DESCRIPTIVE AND APPLIED INCLUDING ELEMENTARY HELMINTHOLOGY.—By L. E. H. Whitby, C.V.O., M.A., M.D. (Camb.), F.R.C.P. (Lond.), D.P.H. Second Edition. 1934. J. and A. Churchill Limited, London. Pp. ix plus 338, with 74 illustrations. Price, 10s. 6d.

THE second edition of this book maintains the characters of the original. The subject-matter is presented from the same aspect, namely the description of certain elementary and essential bacteriological facts and the application of these to practical medicine. Controversial and other subjects are dealt with briefly in small print. There is a great deal of excellent and useful information contained in this book and it is arranged in such a manner that the elementary student can read through the various chapters and obtain a sound working knowledge of the subject without being confused by different theories and discussions on more highly technical subjects. The book is divided into two parts, part one deals with descriptive bacteriology and part two with applied bacteriology, a chapter of 13 pages devoted to protozoal diseases and one of 11 pages for helminthic infections are included. It is not only impossible to deal adequately with such subjects in the confines of small chapters but it is irrational to continue the custom of including these two subjects in books dealing mainly with bacteriology. We are fully aware of the convenience of doing this but would suggest that a more appropriate name for such books should be 'parasitology'.

As a general rule the old bacterial nomenclature has been adhered to and the new nomenclature shown in brackets when a particular organism is described. We would prefer this order to have been reversed and the new nomenclature which is gradually being adopted almost universally to have been introduced, particularly as this is a type of book which is intended primarily for medical students. Turning to the sections of particular importance in the tropics we find many statements which experience in India does not support. Under the section dealing with *V. cholerae* on page 143,

when dealing with serological reactions, there is a statement that agglutinins up to a titre of 1 in 1,000 occur during the disease and carriers also give a positive agglutination test. This statement will tend to leave an impression on the mind of the student of the importance of the presence of agglutinins in diagnosis of cholera whereas actually it is only in convalescence that we find agglutinins in the blood and it is only in that type of carrier who has had the disease that we find agglutinins. Again under diarrhoea on page 273 the student is advised that the examination of the faeces may be supplemented by testing the blood serum for *Widal's* reaction. This is a type of advice which leaves the reader uncertain as to what is meant and in fact in many places this term '*Widal's* reaction' is used without proper definition. These are all the faults that we can find in a book which is eminently suited for the needs of the medical student and which is an excellent introduction to a more advanced study of bacteriology.

C. L. P.

HUMAN PHYSIOLOGY.—By F. R. Winton, M.D., and L. E. Bayliss, Ph.D. Second Edition. 1935. J. and A. Churchill Limited, London. Pp. xvi plus 627. Illustrated with 221 text-figures. Price, 15s.

This book although it is only five years old has now reached its second edition—a fact which tends to prejudice the reviewer in its favour. The academic teacher of to-day, with the curriculum as it is, knows that it is no easy task to instruct the medical student in physiology, keeping in mind that the study is not an end in itself and that only some fifteen months can be devoted to it. The subject, however, as it is set out in these pages should prove a good guide to the teacher and a well-balanced and interesting treatise to the student. The arrangement of the chapters is instructive. Hitherto most books on physiology have devoted a chapter to the biophysics, biochemistry and physiology of the most elementary phenomena of life. Such a chapter is often interesting but usually does not interest the student fretting to go into the wards. This information is or should be given to the student in his preliminary biological course. The authors however commence the book with a discussion of the physiology of muscular activity in its broad aspects. This chapter is interesting and should tempt even the layman.

Then follow chapters on circulation, the blood, respiration, digestion and nutrition, etc. The detailed mechanism of muscle chemistry and renal secretion are taken up later. The final chapters of the book are devoted to the organs or systems which are primarily concerned in the co-ordination and integration of the body as a whole, namely the central nervous system including the special senses and the endocrine organs. The book is not too large for the medical student and yet it touches on all the recent advances. The intimate chemical changes associated with muscle activity are shortly and clearly written. A page or two are devoted to some of the newer work on the rôle of acetyl choline and adrenalin (or adrenergic substance) in the mediation of the transmission of the nerve impulses across synapses and possibly, in the case of acetyl choline, at all myoneural junctions. The description of conditioned reflexes is interesting, particularly the condition of experimental neurasthenia which can be induced and the effect of drugs on these reflexes. It is doubtful if the page and footnote on aphasia is adequate to explain the full significance of Head's conceptions. The few lines however while touching on the trend of modern psychology should be sufficient to stimulate the intelligent student to seek special sources of knowledge on this subject and avoid the too simple ideas which the old stereotyped diagrams engendered.

The book is calculated to make the student think and can be thoroughly recommended as one to keep with him during his clinical studies.

H. E. C. W.

PHYSIOLOGY IN HEALTH AND DISEASE.—By C. J. Wiggers, M.D. 1935. Henry Kimpton, London. Pp. xxvii plus 1156, with 182 engravings. Price, 42s.

This textbook is something new; here is a departure from the plan upon which most of the textbooks on physiology with which we are familiar are built, or perhaps it would be better to regard this book as a scientific approach to the understanding of functional disturbances in man. The author in the preface states 'This physiological manner of clinical approach makes it incumbent upon teachers of medical physiology to give greater regard to its correlation with clinical medicine and surgery; but this must be accomplished without sacrificing considerations of the biophysical, biochemical and mathematical aspects of physiology as a pure science'. After twenty-five years of teaching in three prominent medical schools, the author has experimented with a plan of teaching that (1) stresses the application of pure sciences to physiology, (2) inculcates general principles of physiology, (3) outlines and surveys the functions of various tissues, organs and systems and (4) correlates physiological alternations produced experimentally with aberrant manifestations illustrated on patients. This is a comprehensive plan of instruction and because of the lack of a single textbook which covers the subject-matter the author has produced this book. By judicious curtailment of certain features generally included in standard textbooks of physiology such as extensive anatomical and histological discussions and the condensation of other portions, the author has been able to introduce many new topics of physiological importance which are the attractive features of the book. Further by dividing the book into ten sections and sixty chapters, each chapter covering a complete topic, the author has succeeded in ensuring easy availability of essential facts. Each chapter is further liberally divided and subdivided by distinctive types which permit an easy outlining of information, and the text throughout is illustrated by numerous charts, graphs and figures mostly new, and many problems are presented in a strikingly graphic form. An unusually extensive bibliography is incorporated in the book, a list of important references together with explanatory notes at the end of each reference is given in every chapter.

The book is a mine of information, contains a critical account of the physiological principles and is full of brilliant suggestions, useful comments and interpretations that appeal and interest. The time has certainly arrived when a book such as this will prove most interesting reading for the post-graduate student of medical science and we commend it to all who would consider themselves advanced or modern clinicians. It presents the fundamental characteristics of normal functioning and shows how variations from the normal are produced and is a work which should provide stimulus and new thought both for teachers and students.

C. L. P.

TOXICOLOGY. (CATECHISM SERIES).—By Andrew Allison, M.B., Ch.B., B.Sc., D.P.H., F.R.F.P.S. (Glas.). Third Edition. 1935. E. and S. Livingstone, Edinburgh. Pp. 83. Price, 1s. 6d. Postage, 2d.

THE Catechism Series is undoubtedly to the student mind a godsend. From the general point of view of medical education this view could be questioned, however, as the knowledge purveyed is extremely condensed and tends to lack interest and often perspective.

Certain subjects, however, are especially amenable to such treatment, notably this one. It is not a subject that the medical man is often called upon to deal with, yet the information must be ready to hand as quick action is essential in cases of poisoning.

This little book is written in such a way that it can be easily memorized by those with good memories and

equally easily consulted by those without. It can be confidently recommended both for those in practise and for experts as a number of useful details are given. It should be noted that the price is approximately only a rupee.

H. E. C. W.

ELECTROTHERAPY AND LIGHT THERAPY.—By R. Kovacs, M.D. Second Edition. 1935. Henry Kimpton, London. Pp. 696. Illustrated with 263 engravings and a colour plate. Price, 35s.

THE popularity of this work is shown by the fact that this second edition has appeared within three years of the original one.

The popularity is well deserved. Dr. Kovács is one of the leading practitioners and teachers in the subject of electrotherapeutics in America and every page bears the stamp of authority.

The first part of the book, comprising four chapters, deals with elementary principles of physics and electricity.

The second part deals with general electrotherapy and electrodiagnosis. No praise is too high for this section. Its treatment is masterly. Such new subjects as short- and ultra-short-wave diathermy are included, as is the production of artificial pyrexia by diathermic methods.

The third part deals with light therapy—a well balanced account, completely lacking in the excessive enthusiasm of some writers who find a plea for light therapy for conditions ranging from a common cold to inoperable carcinoma.

The last section of the book, a considerable one, deals with the application and more practical aspects of both the preceding sections.

This is primarily a work for the specialist in electrotherapy or general physicians who do some practice in the subject. As such no praise is too high for it.

It will also find a place on the shelves (and we hope, sometimes, the desks) of other practitioners and students to show them what can be done by modern electrotherapeutic methods, and also occasionally to warn them as to their limitations.

G. G.

A TEXTBOOK ON THE NURSING AND DISEASES OF SICK CHILDREN FOR NURSES.—By various authors. Edited by A. Moncrieff, M.D., F.R.C.P. (Lond.). Second Edition. 1935. H. K. Lewis and Company Limited, London. Pp. xiv plus 583, with 112 illustrations. Price, 15s.

Nursing and Diseases of Sick Children is a textbook for nurses and is designed to cover the syllabus for the certificate for sick children's nurses issued by the General Nursing Council of England and Wales. It is the work of several medical men each an expert in his subject and the whole has been discussed with members of the nursing profession to ensure that adequate emphasis is given to the practical details of nursing.

The book is divided into two parts: part I dealing with the care and nursing of the child and part II with diseases of children. Part I is further divided into three sections relating respectively to the general care of normal and sick children, general medical nursing of sick children and general surgical nursing. Part II is a concise yet remarkably complete account of the ills to which the child is liable. It more than covers the nursing syllabus and should prove a standard reference book for members of the nursing profession. Tropical diseases have unfortunately no place in the volume. There are several useful appendices including one on drugs and their action, another on breathing exercises after tonsillectomy and one on speech training after cleft-palate operation.

Hospitals for sick children and even children's wards in general hospitals are conspicuously absent in India and the training of nurses in this aspect of their

profession is very inadequate. This is the more regrettable since it is just in this field, where the patient can give little help by describing symptoms, that the nurse trained to observe and record can be of most value to the doctor and of most comfort to the parent. 'The best nurse is not the one who knows most but the one who observes best'. This textbook supplies all that the nurse can want not only of knowledge of children's diseases but for the nursing and observation of children. It will be invaluable to her and to her teachers in the daily routine of the child's sick room. *Nursing and Diseases of Sick Children* is a standard book on a subject rarely written on by experts and it can be cordially recommended.

J. M. O.

TABLE OF INCOMPATIBLES.—By Dr. R. N. Worrall. 1935. John Bale, Sons and Danielsson Limited, London. Price, 1s. 6d.

THIS is a table printed on a thick sheet of paper about 17 inches by 16 inches. The names of 56 important preparations are printed vertically on the top and bottom of vertical lines. The same names in the same alphabetical order are printed horizontally on the two ends of horizontal lines. The points of intersection of these central lines are blank if the preparations are compatible. There is a black dot if the preparations are incompatible, and there are circles if they are not strictly compatible. Some of the preparations which are more or less poisonous are underlined in order to draw the special attention of the readers. The prescriber or dispenser is thus enabled to see at a glance the suitability of a particular combination of drugs and is saved the time and trouble of racking his brains or hunting through some textbook. On the opposite side of the sheet are given lists of some reducing and oxidizing agents, some acid and alkaline preparations and also some hints under the heading of miscellaneous reminders. A table like this could not be made exhaustive within a limited space but it will certainly prove useful to a busy prescriber or dispenser. The utility of the table could perhaps be increased by printing all the information on one side of the sheet.

S. G.

THEORY AND PRACTICE OF NURSING.—By M. A. Gullan, S.R.N. Fourth Edition. 1935. H. K. Lewis and Company, Limited. Pp. xvi plus 259, with 3 coloured illustrations. Price, 9s.

THE fourth edition of this book has been thoroughly revised and brought up to date and several additions have been made which will make it of greater value to nurses.

A scale of constituent and caloric values per ounce of representative foods has been introduced, which should arouse a common-sense interest in the nurse regarding food values, both in quantity and quality, in a normal diet. The value of the blank leaves, interspersed in various chapters, cannot be too highly emphasized, as the nurse in training can add brief notes of her practical experience bearing on the subject, which will make the book especially useful to her.

It is in every way to be recommended to nurses in training in the United Kingdom.

M. A.

MEDICAL CASE-TAKING.—By Bidhu Bhushan Pal, L.M.S. 1935. Published by Indu Bhushan Pal, M.B., 1/1, Ananda Chandra Roy Street, Dacca. Pp. xi plus 191. Price, Rs. 2-8 (Cloth bound). Rs. 2 (Paper Cover)

THE importance of a methodical examination of patients cannot be overestimated. It forms the groundwork of learning in all medical subjects. In this book the author has endeavoured to compile in a small space the method of examining patients and to teach the student what he should look for. The book will prove useful to a student while attending his clinical lectures. Certain sections are however too short. A

beginner will not learn in this book the technique of blood pressure reading, blood counting and staining methods, etc. Only the rough Tallqvist's method which usually gives misleading figures of haemoglobin estimation has been referred to. Statements such as 'frontal

headache is due to dyspepsia, occipital...constipation, vertical...anæmia or debility' cannot be commended.

The book has no illustrations nor index. There are many printing mistakes.

R. N. C.

Abstract from Report

ANNUAL REPORT OF THE ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH FOR THE YEAR 1931

As this is the first Annual Report of the Institute, it will not be out of place to recapitulate shortly the ideas and events which led to the conception of an All-India Institute of Hygiene, to its construction, and finally to its formal opening on 30th December, 1932.

Public health policy in India started with the taking over of the administration of British India by the Crown in 1857. The high mortalities among British and Indian troops and in the civil population attracted the attention of Parliament and in 1860 a Royal Commission visited India and made recommendations for the improvement of health and sanitary conditions in India. This Commission recommended that sanitary commissions should be appointed in the major provinces of Madras, Bengal and Bombay. These commissions were established and for some years did good work. Departmental jealousies and other causes however led to their gradual emasculation and by 1900 they had been reduced to one officer, the sanitary commissioner, who had little or no staff and whose duties were largely confined to inspecting vaccinations. The advent of plague in 1896 led to a general awakening of everyone's responsibilities in the matter of health and prevention of disease, and in 1912 the Government of India formulated an important declaration of sanitary policy, establishing research on a sound basis, and giving grants to local governments for the augmentation of their sanitary staff, both central and provincial. The Government of India in a resolution insisted that candidates for assistant directorships of public health should have a British Diploma of Public Health. Health officers of first class towns were required to have a registrable qualification and a British Diploma of Public Health. In this resolution they stated, 'The necessity for a British Diploma of Public Health will however only be temporary, as the Government of India trust that it may be possible to waive the second restriction as soon as arrangements can be made in India which will enable Indians trained in this country to become health officers of the first class'.

Provincial governments took up the question of providing such training, and qualifications in public health and higher diplomas and degrees demanding specific courses of training were initiated by the universities of Bombay, Madras, Calcutta and Lucknow. These, however, naturally retained a provincial outlook. The conception of providing courses in hygiene on a wider basis originated with Sir Leonard Rogers who in 1914 conceived the idea of establishing institutes in India for post-graduate study in tropical medicine and hygiene. Sir Leonard's first proposal was that there should be a School of Tropical Medicine in Calcutta, and an Institute of Hygiene in Bombay, and that both of these might be on an all-India basis. Various circumstances and considerations prevented these views from coming to fruition, but it was chiefly owing to Sir Leonard Rogers' perseverance and enthusiasm and to the generosity of the Governments of India and Bengal and various private benefactions, that in 1920 the Calcutta School of Tropical Medicine and Hygiene, which combined teaching and research in both tropical medicine and hygiene, was opened. A Professorship in Hygiene was established, and a course of instruction arranged in the School for the Diploma of Public

Health of the Calcutta University. There were obvious limitations to the scope and outlook of this arrangement. However enthusiastic one man may be, there are now so many aspects of public health both of temperate and tropical climates, each of which is rapidly developing and requires the full attention of a single worker and teacher, that it is impossible for a single person to combine the qualities or to find the time necessary to assimilate, digest and teach the diverse subjects comprising the entity known as modern public health. Workers highly trained in general hygiene and specialists in some particular branch are needed in India, and as time goes on and public health policy broadens and expands in all Indian provinces, such workers trained in Indian needs and with Indian experience will be more and more required. Major-General Sir J. D. Graham, the then Public Health Commissioner with the Government of India, said in his Annual Report for 1925 (Section VIII):—

*'The need of providing training for public health workers.—*Certain conclusions have been forced upon me after careful study of the position over the last few years. It is becoming increasingly evident that a considerable section of the Indian community is thinking seriously on these public health problems'.

'This is a work which has to be done for the benefit of Indians. To be effective it must carry conviction and establish its position against immemorial conservatism and tradition, it must therefore be done by Indians. It presents a grand and unlimited field for public health workers, but it is well to recognize that the improvement cannot be achieved when the expert labourers are too few in number, that these cannot be increased to the requisite number without a careful system of specialized training in institutes or schools devoted to public health teaching and research, and that cannot be done without adequate financial support. The need for such training of Indian personnel has been advocated for the last two decades by our expert hygienists and research workers in India. It has often been represented, and not without justice, that scientific knowledge in regard to the prevention of certain communicable diseases has far outstripped its application in the field. It is with such a personnel that the practical application must finally rest'. As head of the Calcutta School of Tropical Medicine and Hygiene, Major-General Sir John Megaw arrived at similar views, which were expressed from time to time in the annual reports of the School. Dr. W. S. Carter, Associate Director of the Rockefeller Foundation, in his periodic tours of India and the Far East, met General Megaw and General Graham on various occasions and became deeply impressed with the necessity for establishing an all-India institute of hygiene. Much of the teaching in basic subjects, such as bacteriology and protozoology, for the Diploma of Public Health is similar to that for the Diploma of Tropical Medicine, and as this was being taught in the School of Tropical Medicine, Dr. Carter at once grasped the obvious advantages of Calcutta as a location for an all-India institute, and of a site close to the Calcutta School of Tropical Medicine, where the basic subjects would continue to be taught. It would thus be unnecessary to duplicate these courses, and at the same time the institute would deal with purely public health subjects especially related to Indian requirements. As a result of discussion with General Megaw and others,

Dr. Carter, on behalf of the Rockefeller Foundation, addressed the Government of India in terms embodying these proposals, offering to provide the cost of acquiring the site selected, and to build and equip an all-India institute of hygiene and public health, and further asking for the Government of India's assurance that they would meet the recurring cost of staff and maintenance after the building was handed over to them. The Government of India gratefully accepted this munificent offer and negotiations for the acquisition of the site were commenced. This was acquired finally in July 1930, and the site was cleared and building commenced in September. A constructional committee composed of the Public Health Commissioner with the Government of India, the Surgeon-General with the Government of Bengal, the Chief Engineer with the Government of Bengal, the Chairman of the Calcutta Improvement Trust, and the Accountant-General, Bengal, was appointed to arrange for the construction of the building. Lieutenant-Colonel A. D. Stewart, Professor of Hygiene in the Calcutta School of Tropical Medicine, was appointed Director-designate of the new Institute, and Lieutenant-Colonel A. A. E. Baptist, Assistant Director, to superintend the actual details of construction and equipment.

The building was completed early in 1932 and was formally opened by H. E. Sir John Anderson, Governor of Bengal, H. E. the Viceroy being unable to perform the function owing to indisposition.

The building practically adjoins the School of Tropical Medicine with which it harmonizes in design and appearance.

The plan is based on the 'unit room' system, the unit room being 25 by 21 feet. The building is four storied and is E-shaped, the long limb being in the centre. Six sections can be accommodated, viz, (1) Public Health Administration, (2) Sanitary Engineering, (3) Vital Statistics and Epidemiology, (4) Biochemistry and Nutrition, (5) Malariology and Rural Hygiene, and (6) Maternity and Child Welfare and School Hygiene. Each section has one unit room for the head of the section and two unit rooms for the workers. The working sections are placed in the central limb of the building, facing north with an excellent and unimpeded north light. In the west block are placed the administrative rooms, lecture theatre, practical class rooms, museum, and a large auditorium to seat 200 people. The eastern limb houses store rooms, common room, and lunch room for students, spare working rooms and lavatories, while a separate annexe provides for an animal room on each floor. The library is in the centre block on the top floor. Three unit rooms on each floor and the library and reading room are provided with conditioned air during the hot months of the year. The head of each section has a cooled unit room and in addition there is a spare cooled unit room on each floor where workers on that floor may work in comfort, or engage in any special work requiring a cooled atmosphere.

Owing to the sudden financial crisis at the end of 1931, the Government of India found themselves unable to shoulder the financial burden of Rs. 3,50,000 per annum which the six sections required and decided to allot a sum of Rs. 2,00,000 per annum, agreeing to restore the original sum when monetary conditions improved. Accordingly only four sections were opened, the sections of Sanitary Engineering and Maternity and Child Welfare remaining in abeyance. The committees of the Countess of Dufferin Fund however and of the Red Cross Association of India, realizing the importance of the section of Maternity and Child Welfare and especially the necessity for providing post-graduate instruction in the work not only for men but especially for women graduates, agreed to lend the services of Dr. Jean M. Orkney to initiate the section and also to grant the necessary funds to finance the section.

Functions and purpose of the Institute.—It has often been stated and with a considerable degree of truth, that scientific research work and knowledge of disease

in India has far outstripped its practical application throughout the country. How to achieve this in practice is one of the most difficult and fundamental difficulties in India. To apply scientific knowledge to prevention of disease requires at the beginning a desire for health on the part of the whole population, both as individuals and as a community. Knowledge acquired by such a desire must be put into daily and constant practice by everyone, and everyone must be prepared to pay something towards concerted action. Local bodies must be actuated by the same desire to improve the environmental conditions of the villages, towns and districts under their charge, and must be furnished with the necessary powers and necessary funds. They must however have the guidance of an expert sanitary officer who has under his control a sufficient and trained staff. Local bodies in their turn must be guided and controlled and when necessary compelled by a competent department of health of the local government, whose duties and powers will have been laid down clearly by the legislature. All this requires wise and farsighted statesmanship and legislation, and calls for the exercise of the highest and best features of individual and national character. It demands a certain status of economic development of the people, and a certain standard of education throughout, and above all an understanding of the value and the possibilities of human existence and a constant desire for improvement and betterment. It is quite obvious that the establishment of one institute cannot do all this but it can play an important part. While it may later have wider spheres, at first it must take on the important rôle of training staff who will later play the important part of improving environmental conditions throughout India, and of advising local bodies, and educating the people in the principles and practice of health ideals. This training will always be one of the main tasks of the Institute and every endeavour will be made to make this training as good as possible, keeping in view the needs and problems of the different provinces of India. In this training the School of Tropical Medicine co-operates to the fullest extent and the subjects of Bacteriology, Protozoology, Entomology and Public Health Laboratory Practice are taught by the staff of the School. Though the School of Tropical Medicine is a provincial institution under the Government of Bengal, it has never really been provincial in training or outlook, and it is in the interest of the whole of India that the teaching in the School should remain at a high standard of excellence.

Post-graduate qualifications such as the Diploma of Public Health or B.Sc. in Sanitary Science are required for most health appointments. The University of Calcutta has for some years given a Diploma of Public Health which in common with such qualifications granted by other Indian universities is accepted for many of the health appointments in India. The School of Tropical Medicine is already affiliated to the University of Calcutta and the Institute will shortly also be affiliated. Most of the post-graduates under training proceed to take the Diploma of Public Health of the Calcutta University. This is open only to graduates, however, and it is recognized that there are many workers in public health in India, both in military and civil employ, and in Indian States, who would benefit greatly by a thorough training in public health, and who could proceed to a career in public health and in sanitary departments if they also possessed a diploma in public health. This question was very carefully considered by the Government of India and the Government of Bengal, and it was agreed that a Diploma in Public Health and Hygiene should be granted by the Faculty of Tropical Medicine and Hygiene of Bengal. This Diploma will be essentially of the same standard as the D. P. H. of the Calcutta University. Candidates for training for this Diploma will be specially selected. They may be sub-assistant surgeons who have done health work or they may be holders of medical diplomas who have shown special

aptitude in health work or research, or military assistant surgeons not holding a university degree. Applications for this course are carefully considered by the selection committee and only such applicants accepted as are considered suitable by education and achievement, to benefit by the course.

The regulations for the D. P. H. of Indian universities are mostly based on those of the General Medical Council of Great Britain. The training for the D. P. H. in Great Britain is specially designed for training and turning out doctors fitted to be assistant medical officers of health in the United Kingdom. Public health conditions and public health administration are peculiar to each country and it is obvious that more and more of our health officers should be trained in India, though the broadening and educative value of study and travel abroad will always be desirable. The work of an assistant medical officer of health in Great Britain is largely confined to urban areas, as over 80 per cent of the population in the United Kingdom live in fairly large towns. It is natural that his training in practical public health administration should be done in towns, and the regulations of the General Medical Council insist on this. In India it is different as most of the population live in rural areas. The regulations for the D. P. H. in India however being based on those of the General Medical Council still insist on training in methods of public health administration in a large town. While this is undoubtedly both necessary and desirable the necessity for practical training in rural health problems has been overlooked or not sufficiently stressed. One reason for this has been the lack of well-organized rural health organizations where up-to-date methods dealing with the problems of rural areas in India could be demonstrated. I think the University regulations in this respect need reconsideration, but until we have better organizations in rural areas it may be better to leave this question as it is at present and to demonstrate the present problems of rural areas as they now exist. A malaria research station in a rural area is a necessity for a teaching institution and while we have established the nucleus of such a station near Calcutta, it needs enlarging and putting on a better basis.

The Calcutta University has recently instituted a Doctorate of Science (Public Health) which will be a higher degree open to those holding the D. P. H. and will be obtainable after a year's study and research in some special subject in public health. A thesis on this subject will be submitted and a higher examination in the general aspect of public health also taken. Short courses of post-graduate instruction in special subjects for public health are also being arranged. These will be intended for public health workers in India desiring to refresh their knowledge in special subjects such as statistics, nutrition, malariology, etc. Such courses will be of about 3 months' duration, and it is hoped will be taken advantage of by members of provincial public health staffs and others.

Mention has been made of the section of Maternity and Child Welfare. There is a great need in India for more doctors specially trained in maternity and child welfare work. This work all over India has grown up sporadically without much forethought, planning or co-ordination, and mostly by voluntary agencies who deserve great credit for initiating the work. The need for trained women graduates who could take charge of the work and direct and develop it on proper lines has been felt, and hitherto the only means of obtaining such training was to proceed to London or elsewhere. The Faculty of Tropical Medicine and Hygiene of Bengal in 1933 decided to create a Diploma in Maternity and Child Welfare to be given to women graduates after examination and a course of training in the Institute. One course has already been held in 1933 and another is now under progress.

Research and investigation.—The problem of cholera is one of the most pressing in India and it is fitting that the Institute during the first year of its existence

should have devoted considerable attention to this disease.

The study of conditions making for endemicity or epidemicity is obviously one of extreme interest and importance not only to India but to the outside world. Since the cause of cholera is known, it was natural that the causes of endemicity and epidemicity should be sought in the vibrio itself. Agglutination by a high-titre serum as a fundamental diagnostic property of a 'true' cholera vibrio was probably first laid down by Kolle and Gottschlich in 1903, and as late as 1933 was accepted by the Office International as one of the principal criteria in the recognition of the true cholera vibrio. It is to be noted however that Kolle and Gottschlich themselves found many discrepancies, but they attributed such irregularities to faults in plating technique and to contaminations. Later results however showed that non-agglutinating vibrios were found under a variety of conditions which demanded closer study and interpretation. d'Herelle and others found such non-agglutinating vibrios in pilgrims at El Tor returning from the Hedjaz pilgrimage. d'Herelle was of opinion that as these vibrios had never been incriminated with outbreaks of epidemic cholera the persons carrying them were therefore harmless. Tomb and Maïtra and Brahmachari in India working in endemic areas found that the number of such non-agglutinating carriers progressed in number during the cholera season and diminished as the season declined. In 1933 Pasricha made a very definite contribution to the problem by finding that, in the annual cholera season in Calcutta, the great majority of typical cholera cases at the beginning of the epidemic were non-agglutinating, that at the height of the epidemic agglutinating strains were universal, and that non-agglutinators again made their appearance at the decline of the season. This has made us revise many of our ideas as to the rôle of the non-agglutinating vibrio. Doorenbos's classification of endemic and epidemic types of vibrios does not, at least at present, seem justified. The whole carrier question has assumed great importance and a voluminous literature has developed in relation to it. It became obvious that there were a series of puzzling problems of a diverse nature relating to cholera which needed co-ordinated investigation and in 1931 proposals were made by the Indian Research Fund Association for the establishment of a Cholera Commission which would investigate the various aspects of the problem in India in a carefully co-ordinated manner. Unfortunately the financial crisis abruptly stopped this scheme, though research on various aspects of cholera still continued in India. The urgency of some co-ordinated investigation into certain aspects however was again brought forward in 1932 by certain findings in Syria where healthy persons coming from Iraq were found to be carrying agglutinating vibrios, and this despite the fact that many of them not only had been inoculated, but came from areas which were not infected with cholera. What was the significance and danger of such people and such vibrios? The matter, being one of international importance, was discussed at various meetings of the Permanent Committee of the Office International d'Hygiène Publique. At the May meeting of 1933 which I attended as the representative of the Government of India, the matter was discussed fully and I conveyed the views arrived at to the Government of India. These were that the fundamental problems of vibrio character under conditions of epidemicity and endemicity could only be studied in India, and the same applied to the carrier problem. The Office therefore requested that the Government of India might start investigations into the particular points. In his note to the delegate from British India, the President of the Permanent Committee particularized the following points for investigation in India:—

(a) Do the vibrios in the intestine either of convalescent or healthy carriers properly so called, preserve or do they lose their pathogenicity?

(b) In what way is the virus of cholera maintained in the endemic regions during inter-epidemic periods, is it by means of one or other of these two categories of carriers or by both of them or otherwise?

(c) In an endemic region do vibrios in the intestine of a carrier which have been deprived of their virulence, recover their virulence and become the cause of the outbreak of an epidemic of cholera?

(d) In epidemic regions, is the rôle of convalescent or of healthy carriers the same as in endemic regions?

(e) Is it possible for a healthy carrier in an epidemic region to be the origin of a case of cholera?

(f) Has it been found possible to obtain a rapid sterilization of cholera carriers and, if so, by what means?

The Permanent Committee of the Office at this meeting passed the following resolution:—'It would be desirable that a technical Research Committee should be formed in British India in order to elucidate some obscure points in the cholera problem, among others the pathogenic significance of vibrio disseminated by carriers, according to their place of origin'.

The Government of India referred this communication to the Indian Research Fund Association which, having already decided on the formation of a Cholera Commission in 1931, naturally gave the communication the most careful consideration. Though a Cholera Commission had not actually been formed, important work was being carried on in India into the phenomena associated with cholera plague in Patna under Dr. Asheshov, in Shillong under Lieutenant-Colonel Morison and in Calcutta under Captain Pasricha. Important chemical investigations into the structure of the cholera vibrio had also been commenced by Dr. Linton at the All-India Institute of Hygiene in Calcutta. In addition to the Working Committee on Cholera, the Scientific Advisory Board of the Indian Research Fund Association formed also an Advisory Committee on Cholera with the object of co-ordinating all the work to be done on cholera in India and it asked this Advisory Committee to frame proposals for work which would, if thought necessary and desirable, embody the proposals put forward by the Office. The Governing Body of the Indian Research Fund Association eventually agreed to proposals put up by the Cholera Advisory Committee on the lines of a scheme outlined by Lieutenant-Colonel Taylor. This enquiry is located mainly at the All-India Institute of Hygiene in Calcutta and comprises a field section in an endemic area under Dr. Lal, a bacteriological section in the School of Tropical Medicine and All-India Institute of Hygiene under Captain Pasricha, a biochemical section under Dr. Linton in the All-India Institute of Hygiene and a clinical enquiry under Captain Pasricha at the School of Tropical Medicine. A section at the Central Research Institute under the Director is also correlated with the enquiry, and the enquiries into bacteriophage at Shillong and Madras are also within the purview of the Advisory Committee.

One of the main objects of the enquiry is to collect vibrios from cases of cholera, convalescents, and carriers (so called). These vibrios are thus of known origin and related to definite happenings in the field. These vibrios are first isolated, and then passed on to Captain Pasricha's section for further investigation as to the agglutinability and biochemical reactions. Particular and selected strains are then examined for their reactions to the various types of phage, and passed on to Dr. Linton for determination of their structure, and to the Director, Central Research Institute, for particular serological examinations, particularly with regard to their antigenic structure and their reactions to O and H agglutinating sera. (Dried O antigen has been suggested as a reliable differentiating agglutination reaction.)

These results are then pooled and correlated with the relationships to the original happenings in the field. In this manner it is hoped to correlate particular types of vibrio with particular happenings in the field endemic

area. The problem of endemicity is also being investigated by statistical methods in the section of Epidemiology and Vital Statistics of the Institute.

The enquiry has not been established long enough to give pronouncements of definite value. Of particular interest we think is the grouping of vibrios suggested by Dr. Linton as the result of his studies. The vibrios fall into 6 groups according to the individual combinations of protein and carbohydrate. It is of interest to note that the large proportion of vibrios isolated from cholera cases fall into group I and that the El Tor vibrios which are agglutinable but apparently non-pathogenic are associated with the ordinary cholera vibrio by their carbohydrate (which may account for their agglutinability) but to water vibrios by their protein (which may account for their non-pathogenicity). Personally I regard Dr. Linton's work as a contribution of the greatest interest and importance to the classification of cholera vibrios and it is with some expectation that we look forward to seeing if the vibrios isolated from cases and carriers (carriers both associated with transference of disease, and those not so) will fall into Dr. Linton's groups with any consistency. A reference to Dr. Lal's report will show that a study of endemicity on statistical lines is likely to elucidate very interesting facts. Endemicity of cholera is by no means uniform in Bengal, or even in the district of 24-Parganas which has a very high endemic figure. The analyses and investigations in this direction however have not gone far enough yet to make definite pronouncements.

I would draw attention to some features of interest in the report on the section of Biochemistry and Nutrition. This section was opened in March 1933 and a large amount of time has naturally had to be expended in organizing and equipping the section. It will be noted that Dr. Wilson regards two lines of work as of fundamental importance, namely, an accurate knowledge of the basic composition (including vitamins) of all the ordinary Indian foodstuffs, and diet surveys of the different classes and communities. Without this preliminary information, it will be impossible to criticize or to offer suggestions for improving the nutrition of the community. In this he is in agreement with Sir Robert McCarrison whose ambition it was to establish a nutritional institute in India, one of the main objects of which would be to conduct work along these two lines. The idea of a nutritional institute for India has unfortunately not yet fructified. Sir Robert McCarrison is on the point of retirement. On the appointment of his successor, early opportunity will be taken to discuss the work to be carried on at the Nutritional Institute at Coonoor and at the All-India Institute of Hygiene so that co-operation may be maintained, work rendered complementary, and unnecessary overlapping if possible avoided.

The Department of Malariology and Rural Hygiene under Dr. Krishnan has now been equipped with all the necessary equipment both field and laboratory for demonstrating methods of malarial investigation and control to post-graduates. This is of great importance as students proceeding to the D. P. H. should be fully acquainted with methods of investigation and control of the principal disease in India, *viz.* malaria. It is necessary therefore to have a field station attached to the Institute and it is hoped that this will soon be established. Dr. Krishnan has continued his interesting work on the relationships of the reticulo-endothelial system to malaria and blackwater fever. Hæmoglobinuria is apparently the result of two factors, the destruction of a large number of infected red cells by the malarial parasite, and the shedding of hæmoglobin products into the blood from these cells owing to the absence of a sufficient number of phagocytic reticulo-endothelial cells. Hæmoglobinuric fever is thus associated with questions of immunity or tolerance to the malarial parasite, with the production of intense infection, with treatment with quinine and with the mechanism of production and action of reticulo-

endothelial phagocytes. Dr. Krishnan is at present investigating these points, especially with a view to treatment, in monkeys infected with malaria; and it is hoped valuable results may emerge which will be applicable to blackwater fever in human beings. The department has also given useful assistance to outside bodies.

I have already noted that the department of Maternity and Child Welfare was kept in abeyance by the Government of India owing to financial stringency, but that the Countess of Dufferin's Fund and the Red Cross had kindly come forward and offered to start the section. This offer was gratefully accepted and Dr. Orkney has directed and controlled the section during the year. The initiation of a Diploma in Maternity and Child Welfare by the Faculty of Tropical Medicine and Hygiene of Bengal has already been mentioned, and one of the main reasons for the Dufferin Fund Committee in partially financing this section was to provide facilities for training post-graduates in this diploma. An essential part of such training is district work and facilities for this have been provided by the establishment of a maternity and child welfare clinic in Ward 8 which is close to the Institute. This clinic is popular and doing good work in the Ward; it is assisted by grants of money and milk from the Calcutta Corporation and it has been possible to extend its activities largely, and to add a nursery school and a nucleus of school medical inspection by a grant from the Calcutta Health Week Committee, to which we are naturally very indebted and grateful.

Tuberculosis Research under the Indian Research Fund Association.—This enquiry, under the auspices of the Indian Research Fund Association and financed by it, has been carried on by Dr. A. C. Ukil since 1928, and in 1932 accommodation was provided for it in the Institute.

Dr. Ukil has shown that the remarkable absence of tuberculosis in mortality figures in infants in India is probably more apparent than real. From an extensive examination carried out over the last four years, Dr. Ukil is of opinion that the extent of tubercularization of the population in India to-day is midway between that of the African races and the highly industrialized and urbanized European races, and that India and China are probably on the same level. Dr. Ukil has found no bacilli of the bovine type in either glandular or osteo-articular lesions. The reactions of various classes of individuals in India to infection have been carefully studied. In rural areas, predominantly, exudative lesions are found, while the urban populations usually show a more productive type of lesion. The rôle that allergy and immunity play in phthisis amongst Indians is the subject of present investigation. The possibility of application of inoculation with B. C. G. bacillus is being studied. Dr. Ukil is attached to the Medical College Hospital where there is a large outdoor department devoted to tuberculosis. He is also in close touch with the Tuberculosis Association. He is therefore in a very favourable position for the investigation and study of tuberculosis in India.

The researches in kala-azar and in leprosy are also accommodated in the Institute but they are under the Director of the School of Tropical Medicine. An important investigation into the presence of *A. ludlowi* in the vicinity of Calcutta which is being carried out by the Public Health Department of Bengal is also housed in the Institute. This mosquito which normally breeds in brackish water was known to exist in the Southern Sunderban areas of Bengal. In 1931 however a severe outbreak of malaria about 20 miles from Calcutta was found to be due to its presence. An investigation by the Bengal Public Health Department was instituted and it was found that *ludlowi* had taken on migrating habits and was being carried by country boats to the neighbourhood of Calcutta. The enquiry is undertaking preventive measures as well and when complete it will form a most interesting chapter in malarial biology.

Correspondence

LIVER EXTRACT IN EPIDEMIC DROPSY: A SUGGESTION

To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,—Epidemic dropsy has recently been fairly prevalent in Calcutta and I have treated a considerable number of cases. Some of these cases have less oedema than others, and it is generally amongst the former that the heart dilates, and suddenly there is acute cardiac distress with dyspnoea and cyanosis that nothing can relieve, and the cases end fatally.

One of my cases, Mrs. M., was sent to Deoghar for a change where she went for a walk uphill and leucematemesis suddenly started. She came back to Calcutta and had several bouts of hæmatemesis with at the same time a peculiar mottled dark hue in the face and tenderness over the hepatic region. She had looseness of the bowels also. From the fact that there is undoubtedly a metabolic upset in epidemic dropsy and probably calcium deficiency, from the fact that liver extract is recommended in certain hæmorrhagic conditions, and from the tenderness of liver in the patient the idea occurred to me that liver extract injections might possibly be useful. I gave her one injection and the effect was remarkable. With one injection the hæmatemesis stopped but reappeared a few days later. I continued the injections and her distress gradually subsided. I gave her twelve injections altogether, with ordinary dietetic restrictions, and she has no more symptoms of epidemic dropsy.

Encouraged by the result I have given liver extract injections in more than a dozen cases, irrespective of the symptoms, and have found substantial benefit in all of them. I have used several brands of liver extract. With Hepatopson I found some people became giddy immediately after the injection, but with Campolon and liver extract (Bengal Immunity) I did not find this. A full dose of Campolon seems to be too much for these cases, so I generally give one-quarter to half of the dose. The Bengal Immunity liver extract being less concentrated, I give a full dose.

I am now following the routine practice of giving liver extract and colloidal calcium injections with vitamin D ostelin on alternate days and find the results much better. When the symptoms totally disappear I stop the injections and advise my patients to take liver extract and calcium preparations orally. Although this method of treatment is admittedly empirical and I cannot produce any data, I think it worth while recording my experience as a suggestion to others who might try it and corroborate or contradict my results.

In my opinion there is no doubt that the dilatation of the heart and the tachycardia is remarkably influenced. If the pulse rate is 120 or over, it comes down to about 90 after three or four liver extract injections. Of course it is needless to add that such precautions as abolition of rice diet, absolute rest in bed, and plenty of fresh vegetables and fruits rich in vitamin are essential whatever line of treatment is adopted.

Yours, etc.,

PASUPATI BHATTACHARYYA, D.T.M.

CLINICAL EVIDENCE OF RHEUMATIC FEVER IN THE PUNJAB

To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,—As Dr. K. L. Wig remarks in his contribution to your May issue 'the existence of rheumatic fever in the tropics has always been a disputed point'.

Since coming to Madras eight months ago, I have seen over fifty cases of what is clinically rheumatic carditis.

Wassermann-negative cases of mitral stenosis with or without auricular fibrillation are easily obtained from the outpatient department, as required, for teaching purposes.

Typical chorea in children, though not common, is certainly found here and the occurrence of textbook examples of rheumatic nodules is by no means rare.

Four out of ten children's beds in my medical unit are at the present time occupied by sufferers from acute rheumatism with severe carditis—two males aged 10 and 6 and two females aged 10.

Like other workers in India I have to deplore the unwillingness of relatives to allow post-mortem examinations but there is no apparent reason to doubt the correctness of the clinical diagnosis.

All my colleagues on the medical side of this hospital and a large number of general practitioners here tell me that they have for many years been well aware of the occurrence of acute rheumatism in Madras, which has a typical 'tropical' climate—warm and humid all the year round.

Yours, etc.,

GEORGE R. McROBERT, M.D., F.R.C.P.

MAJOR, I.M.S.

GOVERNMENT GENERAL HOSPITAL,
MADRAS,
1st July, 1935.

CONSERVATIVE SURGERY IN MALIGNANT DISEASE

To the Editor, THE INDIAN MEDICAL GAZETTE

DEAR SIR,—I feel a brief answer is called for by Dr. G. Galstaun's letter of 19th April, 1935, in your May 1935 number, in which he criticizes, quite justifiably, my article on conservative surgery for malignant disease which appeared in the March number of the *Indian Medical Gazette*. He apparently thinks that I consider the comparatively small kilovoltage of the x-ray apparatus installed in the Mission Hospital in which I work as being sufficient for deep x-ray therapy. Nothing is, or was, further from my thoughts; but I wrote the article in question with a very definite purpose—namely to show that even with a very moderate-sized x-ray equipment sarcomas in the limbs can be dealt with by its use, combined with surgery and radium, in such a way as to avoid amputation, and at the same time not be followed by recurrence. As a matter of fact, two of the cases reported by me have recurred; one was in the abdomen, and the small voltage of the x-ray apparatus no doubt determined the recurrence. The other was in the arm, and has since had a fore-quarter amputation. But, as everyone knows, in India patients are very prone to run away directly amputation of a limb is suggested; and any method of dealing conservatively with a disease, for which amputation was formerly considered to be the only treatment, may ensure at any rate that the patient in question does not run away to quacks and certain death.

Dr. Galstaun asks about the dosage of radium in the needles I use; the answer is, as quoted by him, 1 milligram per $1\frac{1}{2}$ cm. of needle. The filtration is 0.8 mm. of platinum. I quite agree with Dr. Galstaun that the ideal treatment of most of the cases I mentioned may have been deep x-ray only, at 200 kilovoltage, but there are large areas in India where there is no x-ray plant of this output within several hundreds of miles; and the primary aim of my article was to show that such cases need not be despaired of, nor amputated, but can be treated with a good prospect of success provided great care is taken at every stage of the process. Regarding figure 5, the section showed a small round-celled sarcoma.

Finally, does Dr. Galstaun really think I am such a fool as to consider that my methods are the 'last word' in the treatment of malignant disease?

Yours, etc.,

T. H. SOMERVELL, M.A., M.B., B.Ch.,
F.R.C.S. (Eng.).

SOUTH TRAVANCORE MEDICAL
MISSION, L. M. S.,
NEYYOOR, TRAVANCORE, S. INDIA,
12th July, 1935.

INTRAMUSCULAR VERSUS INTRAVENOUS QUININE

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Dr. Soni's letter in your issue of May 1935, page 298, induced me to read once over again my letter and your comments thereon. I find that two very important points seem to have missed both of you, viz, (1) My observations relate only to malaria in Kenya and particularly Nairobi. What holds good here may not hold good elsewhere. (2) Ninety-five per cent of the cases here are subtertian in origin. (Malaria is a notifiable disease here and blood examination is done free of charge.) The gastro-intestinal tract is usually very irritable and it is only in a small percentage of cases that oral administration is a possibility. As a matter of fact even after the cessation of pyrexia vomiting persists in some cases and requires parenteral administration of quinine to control it.

But, apart from the availability of the oral route, I do state that oral administration of quinine is not successful in a majority of cases where that route is possible. I do hold that 85 per cent of the cases here do need parenteral administration at the beginning of treatment at least. After my writing to you there has been an epidemic of malaria here and I have to state that my experience during the same warrants no change in my views.

Dr. Soni raises the question of relapse; it is hard to answer this. In the heart of this otherwise very beautiful town runs a big swamp which is the hotbed of mosquito breeding and which according to official figures is responsible for 70 to 75 per cent cases.

In the immediate proximity and on all sides of the swamp are residential areas. Under the circumstances distinction of relapse from reinfection becomes a problem. I would, however, like to add that I have not gathered the impression that relapses are particularly more marked in cases treated by intramuscular quinine. I should make it plain that I do not regard one injection of quinine as complete treatment and permanent cure. Quinine in some form or other has to be continued if relapses are to be prevented.

Coming to the intravenous route I regret I cannot help disappointing Dr. Soni. I cannot persuade myself to use that route, as the intramuscular continues to be successful in my hands. Any intravenous therapy is more risky than intramuscular and it is not fair to the patient to expose one's patient to unnecessary risk, however slight it may be.

Yours, etc.,

K. V. ADALJA, M.B., B.S.

REATA ROAD,
NAIROBI
(KENYA COLONY),
13th June, 1935.

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have read with great interest the article regarding intramuscular quinine by Dr. Adalja published in the January issue of the *Gazette*.

My contention is that quinine by mouth should be the method of choice; of course one should see that it is retained. For cases where quinine cannot be given by the mouth owing to excessive vomiting or in cerebral

malaria, it should be given intravenously. It is not as dangerous as practitioners think, if the injection is given as it should be given, viz, 5 grains in 5 c.cm. or 10 grains in 10 c.cm. of a 20 per cent glucosed saline, together with three drops of adrenaline at a rate of one minute for one c.cm.

The patient should be watched carefully for any signs of cyanosis or sweating due to fall of blood pressure during the process of injection. The patient should not be allowed to sit up for at least one hour after the injection. A hot drink should always follow the injection.

I had the opportunity of giving any number of these injections in a military hospital. I never observed any untoward result. In only one case was there a fall of blood pressure with signs of collapse, but an injection of adrenaline revived the patient.

As has been pointed out by Chopra, Roy and Das Gupta (*J. M. G.*, LXIX, 560) the average maximum concentration of quinine in the blood is almost the same by both the intramuscular and the intravenous routes; so in cases where injections become indispensably necessary to save or to relieve the patient, I would prefer the intravenous one because of its (1) painlessness, (2) less likelihood to cause tissue injury (blood vessels, nerves, muscles, etc.), and (3) certainty of absorption and utilization in the organism in all cases without a single exception when compared with intramuscular injections.

I had to resort to many intramuscular injections of quinine amongst the inmates of a mental hospital, as there are many who will not take anything by the mouth. But subsequently I tried quinine solutions with rice *conji* by nasal feeding with better results. This was given with the usual feed. Mental patients are so dirty and will not keep their clothes on so that infection occurs through the site of injection and abscesses are formed.

Setting aside the question of mental patients I can recall several cases of abscess formation after intramuscular injection of quinine in well-equipped and well-staffed hospitals, but I do not remember to have ever seen or heard of a single case of abscess formation or phlebitis after intravenous injections of quinine. It must be remembered that parenteral routes should be reserved for emergencies only.

Yours, etc.,

PRAFULLA KUMAR SEN GUPTA, L.M.P.

OUTPATIENT DEPARTMENT,
BERRY WHITE MEDICAL SCHOOL,
DIBRUGARH, ASSAM,
8th July, 1935.

Service Notes

APPOINTMENTS AND TRANSFERS

COLONEL E. W. C. BRADFIELD, C.I.E., O.B.E., V.H.S., Assistant Director of Medical Services, Peshawar District, is appointed to officiate as Surgeon-General with the Government of Bombay, with effect from the afternoon of the 25th June, 1935, *vice* Major-General H. R. Nutt, granted leave preparatory to retirement.

To be Officiating Deputy Director, Medical Services, Northern Command

Colonel A. W. M. Harvey, K.H.S., *vice* Major-General T. G. F. Paterson, D.S.O., K.H.P., on leave pending retirement. Dated 24th March, 1935.

Lieutenant-Colonel J. B. Hanafin, C.I.E., is appointed to officiate as Civil Administrative Medical Officer and Port Health Officer, Aden, *vice* Lieutenant-Colonel E. S. Phipson, C.I.E., D.S.O., granted leave.

The services of Major R. C. Wats, an officer of the Medical Research Department, are placed temporarily

at the disposal of the Government of Bombay, for appointment as Officiating Assistant Director, Haffkine Institute, Bombay, with effect from the date on which he assumes charge of his duties.

The following officers are appointed to the Medical Research Department on probation for two years, and are placed on foreign service under the Indian Research Fund Association, with effect from the dates on which they assume charge of their respective duties:—

1. Major W. D. B. Read.

2. Captain M. Jafar.

3. Captain J. R. Dogra.

The services of Captain P. Shannon are placed temporarily at the disposal of the Government of the United Provinces, with effect from the 4th May, 1935.

The services of Captain C. F. J. Cropper are placed temporarily at the disposal of the Government of Burma, with effect from the 19th June, 1935.

The appointment of Lieutenant (now Captain) Thomas Kyran White is confirmed, 5th February, 1934, with seniority 5th February, 1933, with precedence next below Captain J. Edis-Myers.

The seniority of the undermentioned Lieutenants (on probation) is antedated to the 23rd April, 1934:—

James Duffy.

Kenneth Cunningham.

LEAVE

Lieutenant-Colonel E. S. Phipson, C.I.E., D.S.O., Civil Administrative Medical Officer and Port Health Officer, Aden, is granted leave for 6 months and 21 days out of India, with effect from the 15th April, 1935.

Major J. J. Rooney, an Agency Surgeon, is granted leave for 4 months, with effect from the forenoon of the 18th June, 1935.

PROMOTIONS

Majors to be Lieutenant-Colonels

E. Cotter. Dated 8th June, 1935.

J. M. Shah, M.B.E. Dated 17th June, 1935.

Captains to be Majors (provisional)

Brevet-Major M. S. Gupta. Dated 2nd May, 1935.

S. P. Joshi. Dated 25th May, 1935.

R. Linton. Dated 29th May, 1935.

H. W. Mulligan. Dated 29th May, 1935.

E. G. Hurd-Wood. Dated 30th May, 1935.

A. Tait. Dated 22nd June, 1935.

Lieutenants to be Captains

J. Edis-Myers. Dated 6th October, 1934, with seniority 1st May, 1934.

T. K. White. Dated 5th October, 1934, with seniority 1st May, 1934.

R. de Soldenhoff. Dated 10th October, 1934, with seniority 1st May, 1934.

C. J. Hassett. Dated 6th October, 1934, with seniority 1st May, 1934.

R. R. Prosser. Dated 8th October, 1934, with seniority 1st May, 1934.

E. Parry. Dated 5th October, 1934, with seniority 1st May, 1934.

W. G. Kennedy. Dated 6th October, 1934, with seniority 1st May, 1934.

P. I. Franks. Dated 7th December, 1934, with seniority 1st May, 1934.

B. F. B. Russell. Dated 10th January, 1935, with seniority 1st August, 1934.

Note.—Army Department previous notifications are cancelled in so far as they relate to the above officers.

Lieutenants (on probation) to be Captains (on probation)

J. Brebner. Dated 16th February, 1935, with seniority 1st August, 1934.

W. J. Virgin. Dated 17th February, 1935, with seniority 1st August, 1934.

H. W. G. Staunton. Dated 17th February, 1935, with seniority 1st August, 1934.

J. D. Gray. Dated 17th February, 1935, with seniority 15th August, 1934.

D. W. Taylor. Dated 10th March, 1935, with seniority 22nd October, 1934.

P. H. Addison. Dated 10th March, 1935, with seniority 22nd October, 1934.

C. B. Miller. Dated 17th February, 1935, with seniority 13th February, 1935.

Note.—Army Department previous notification is hereby cancelled in so far as it relates to the promotion of the above officers.

RETIREMENTS

Lieutenant-Colonel R. H. Lee retires 19th May, 1935.

Lieutenant-Colonel W. J. Simpson retires 27th May, 1935.

Relinquishment of temporary commission

Captain K. C. Virmani. Dated 12th June, 1935.

OBITUARY

It is with very great regret that we announce the death in London on 26th August of Lieut.-Colonel H. W. Acton, C.I.C., I.M.S., formerly the Director of the Calcutta School of Tropical Medicine.

After a period of nearly five years without leave Colonel Acton went home on 6th April, 1933; shortly after his arrival in England he became seriously ill, but recovered sufficiently for hopes of his return to Calcutta to be entertained. However, towards the end of 1934, he decided to retire, and his retirement took effect, we understand, from some date in August, a few days before his death.

The news of his death came as a very great shock to his personal friends, especially to those of us who had seen him in London only a few weeks ago looking the picture of health. His death has left us with a feeling of irreparable personal loss, and we extend our sympathies to Mrs. Acton, to his mother and to his two sons.

Notes

ERGOMETRINE

THE isolation of the new ergot alkaloid, Ergometrine, recently described by Dudley and Moir was followed by the commercial issue of the drug by Burroughs Wellcome and Company, London (England), within the short space of three weeks from the first announcement of the discovery (*British Medical Journal*, 6th April, 1935).

The following preparations of the alkaloid are issued for therapeutic use:—

'Tabloid' Ergometrine, 0.5 mgm., for oral administration.

'Wellcome' Solution of Ergometrine, 0.5 mgm. in 2.5 c.cm., for oral administration.

'Tabloid' Hypodermic Ergometrine, 0.25 mgm., for intramuscular injection.

'Hypoloid' Ergometrine, 0.25 mgm. in 1 c.cm., for intramuscular injection.

'Tabloid' Hypodermic Ergometrine, 0.05 mgm., for intravenous administration.

'Hypoloid' Ergometrine, 0.05 mgm. in 1 c.cm., for intravenous administration.

The alkaloid used in these preparations is of a high degree of purity and crystallizes readily from a number

of solvents as described in Dr. Dudley's later communication (*British Medical Journal*, 13th April). Ergometrine is characterized by the rapidity with which it causes contraction of the uterus and is used clinically for this effect during the puerperium.

Given orally, in a dose of 0.5 mgm. to 1 mgm., Ergometrine produces contraction after an interval of 6½ to 8 minutes, the contractions being identical in mode of onset and general character with those produced by active liquid extracts of ergot. It may also be given by intramuscular injection, in a dose of 0.25 mgm. to 0.5 mgm., which produces strong uterine action in 3½ to 4½ minutes. Intravenously, in a dose of 0.05 mgm., a strong response follows in 110 seconds and in a dose of 0.1 mgm. in 65 seconds.

Ergometrine has a pronounced and more rapid action in a dosage smaller than that required in the case of ergotoxine. It is remarkably free from side effects.

Ergometrine is of particular value for routine oral administration after parturition. Ergometrine, for its immediate action followed by ergotoxine ethanesulphonate for its prolonged effect, would appear to be ideal for use during the puerperium.

'WELLCOME' BRAND INSULIN

BURROUGHS WELLCOME AND COMPANY announce that all 'Wellcome' brand insulin is now made with pure crystalline insulin, the insulin of 100 per cent purity. 'Wellcome' brand insulin is, we are told, the first commercial product to be prepared with pure crystalline insulin.

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Original Articles

RINGWORM OF THE SCALP IN INDIA

By N. C. DEY, L.M.P., L.T.M.

and

P. A. MAPLESTONE, D.S.O., M.B., CH.B., D.T.M.

(From the Medical Mycology Enquiry, School of Tropical Medicine, Calcutta, financed by the Indian Research Fund Association)

OUT of 53 consecutive cases of tinea of the scalp that have been seen at the Calcutta School of Tropical Medicine during the last three years 20 have been found to be caused by *Trichophyton violaceum*; the remainder were caused by *Microsporon audouini* with the exception of two cases of favus.

These 20 cases of *T. violaceum* infection included five Europeans, twelve Mohammedans and three Marwaris. No case was over twelve years of age and seventeen were less than ten years old. Six of the cases were found simultaneously in one family. We have not so far discovered any other species of trichophyton as a cause of this form of ringworm in Calcutta, a similar observation being that of Nicolau (1909) in Rumania.

In nine cases there was secondary infection of the skin as a direct spread from the scalp to the neck, and in one case (figure 1) the infection spread over the whole body, but from the histories of all our cases the scalp was always the primary site. In no case did we find evidence of infection of the beard and the nails.

In early cases there is a bald patch with the hair broken off at the mouth of the follicle and level with the skin, giving the typical 'black dot' appearance. From the primary site the infection gradually spreads so that in older cases there are many small areas of baldness which finally coalesce producing large patches. Attempts to remove broken hairs with forceps generally end in failure, for the infected hair is extremely brittle and will not withstand sufficient strain to allow of the root being pulled out.

The majority of our cases showed no signs of active inflammation and pustule formation in the follicles which is described as common by the Italians Truffi, Della Favera (1909) and others. Ramognini (Pollacci and Nannizzi, 1922) recorded 84 inflammatory cases out of a total of 246 cases of 'herpes tonsurans' caused by *T. violaceum*. We found inflammation and pustules in seven. The examination of material from these pustules proved negative for bacterial organisms in every case and we always obtained a pure culture of *T. violaceum* (plate XII, figure 1). This suggests that the so-called 'pus' formation in this disease is caused by the fungus itself.

Castellani (1919 and 1934) described a clinical type caused by *T. violaceum* which he named *Tinea decalvans perstans* and which showed pityriasis scaliness and permanent baldness. A few of our cases showed small permanent bald patches but we found no evidence of scaliness in any of them.

In the nine cases in which the glabrous skin was affected the infection spread from the scalp on to the neck, face and behind the ears. In a certain number we also found patches on the arms and forearms. In one case the infection had become generalized all over the body and limbs (figure 1). For the most part the limbs were affected on the extensor surfaces but on



Fig. 1.—Case showing secondary infection of body. (The lesions were similar on the chest and abdomen.)

the trunk the infection had spread downwards from the scalp both anteriorly and posteriorly so that the back and chest were extensively involved and the case resembled a severe tinea cruris infection.

In a few instances we found superficial desquamating areas which resembled tinea circinata except that there was no vesicle formation, and in none of them could we recover the fungus from scrapings either by direct examination of scales or by cultures. Similar results are recorded by Georgjevic and Miloehevitch (1935).

Diagnosis.—For direct examination of scrapings or hairs we used a solution of equal parts of saturated aqueous solution of sodium sulphide and 90 per cent alcohol, to which distilled water is slowly added until the initial turbidity

disappears. This reagent will not keep for more than two months.

A hair or scale is placed on a slide under a cover slip and a little of the solution is run in from the side. As a rule the specimen becomes clear in less than five minutes; if clearing is delayed, however, it may be hastened by warming the slide. With practice and in the case of good specimens a 2/3 objective with a $\times 10$ Zeiss ocular is sufficient to distinguish the fungus, but diagnosis should be confirmed with a 1/6 inch objective. In all our cases infected hairs showed large spores 3 to 5 μ or more in diameter. In early stages mycelia with septa at long intervals lying along the hair are seen, and as the fungus becomes older arthrospores form and the septate divisions of the mycelia become shorter. The spores are distributed axially along the hair and give it a characteristic beaded appearance which, apart from the difference in size of the spores, is readily distinguished from the mosaic appearance of the small-spored infection by *Microsporon audouini* (figures 2a and 2b). Epidermal scales show septate mycelia

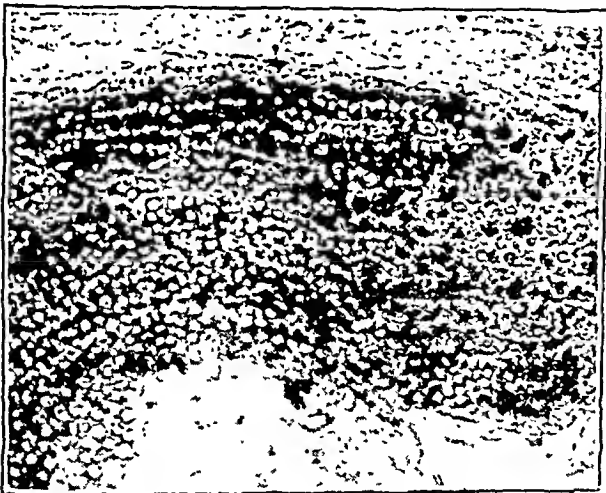


Fig. 2a.—Infected hair. High power $\times 450$.

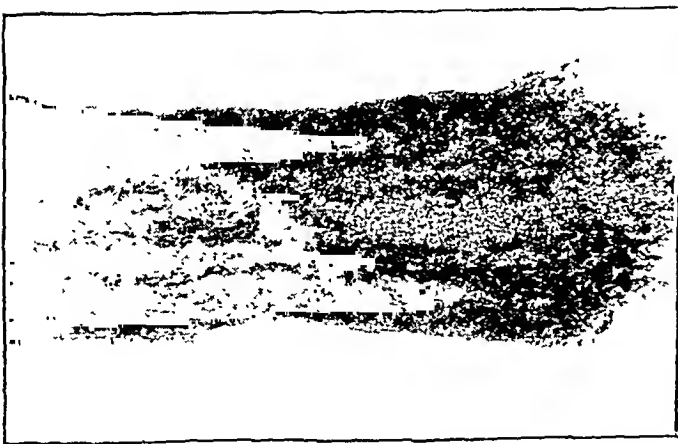


Fig. 2b.—Infected hair. Low power $\times 80$.

which cannot be distinguished from other types of ringworm fungi by direct examination so that cultural methods have to be resorted to to establish the diagnosis.

Culture.—In addition to obtaining growth from infected hair or scales of epidermis we have had success by inoculating 'pus' from infected follicles on the scalp (plate XII, figure 1). Although this fungus grows fairly well on ordinary laboratory media we got the best results with Sabouraud's maltose-peptone agar and Pollacci media. On the so-called natural media of Langeron and Milochévitch (1930), i.e., cereals, etc., growth seldom occurred.

Characters of growth.—On Sabouraud's medium there appeared in about three to four weeks a smooth faviform growth about 2 cm. in diameter, raised above the surface of the medium and showing a varying degree of violet coloration (plate XII, figure 2). The growth was always found to contain a considerable amount of moisture which became evident when it was cut up for subculture or for purposes of examination.

The above is the type of growth that we designate as typical although variant forms such as we describe below were perhaps more often obtained.

(1) **Colour variation.**—The typical violet colour gradually fades with each subculture until the growth is finally cream coloured (plate XII, figure 3) although sometimes the primary culture may be cream coloured (plate XII, figure 3a). Sometimes subcultures are patchy being violet in one part and pale in another. It was also noted that cultures from 'pus' often showed some colonies typically violet whereas others were white or cream (plate XII, figures 4 and 5). We have been unable to maintain in subcultures the same depth of tint as that of the original although those made on glucose agar and Pollacci medium did not lose their colour as rapidly as those grown on other media. Catanei (1931) considered that violet and cream cultures of *T. violaceum* were distinct species because he held that they retained their characteristic colour after animal passage but we have obtained on more than one occasion mixed violet and cream colonies from a single inoculum (plate XII, figures 4 and 5), therefore using colour as a specific character does not appear to be sound. This is further borne out by the finding that the violet colour always fades and finally disappears on repeated subculture. Another difference we noted was that in a medium composed of

Water	1,000	c.c.m.
Agar	15	grms.
Sucrose	30	"
Sodium nitrate	2	"
Dipotassium phosphate	1	gm.
Magnesium sulphate	0.5	"
Potassium chloride	0.5	"

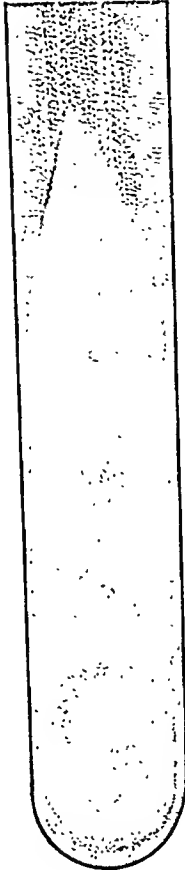
we always found a pink colour instead of violet in primary cultures, but on subculture this also disappears. Although we tried to produce other colour variations by using different media in the way that Acton and McGuire (1927) did in



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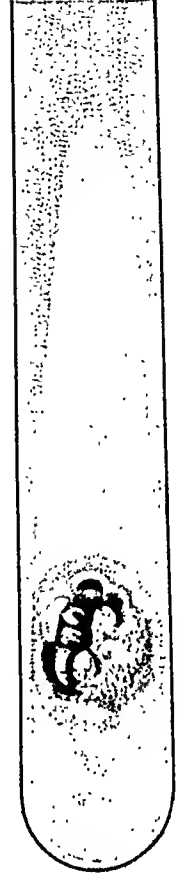
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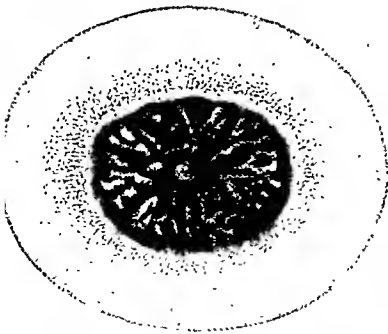
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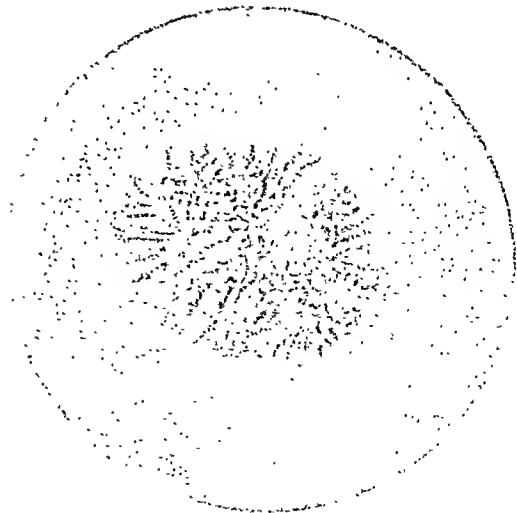
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3 A.

the case of *Epidermophyton cruris* we were unable to do so.

(2) *Character variation*.—The primary culture may be flat on the surface of the medium, of a very light violet tint, and perhaps raised a little in the centre with no radiating furrows. Subcultures from such a growth were also of the same type.

Ducrey and Reale (1896) first drew attention to the tendency of this fungus to undergo pleomorphic changes. This is most often observed in old subcultures showing short white duvet, but occasionally we got the same appearance in primary cultures after a lapse of six weeks or longer (plate XII, figure 6). Subcultures from these altered growths are usually of the same type but at times a modified typical growth is obtained. Microscopically the mycelia are thin and long and have spore-like structures within them. In well-slide preparations both terminal and intercalary chlamydospores are found, and old mycelia show arthrospores. The terminal chlamydospores may be oval or round; they measure 16 to 18 μ in diameter and when old show a double-wall formation. The arthrospores are usually irregular with unilateral swellings; other arthrospores without any swelling of the mycelia also occur; in this case the mycelia show close-septate divisions producing short sections with square-cut ends which in time may become more oval or rounded.

Animal inoculation.—The skin was shaved and an emulsion of an active culture was rubbed on the spot with a glass rod. We inoculated one rabbit, one guinea-pig, one white rat and two monkeys. The guinea-pig and the rat were entirely negative, the rabbit had a slight patch of erythema with a little scaling which cleared up spontaneously, and the first monkey got infection of the hair. Cultures made from this animal showed a more reddish tint than the original culture. In the second monkey a culture of *T. violaceum* which had lost the violet

the infection had spread beyond the area originally inoculated (1½ inches in diameter). On microscopic examination the hair showed an endo-ectothrix infection (figure 4) and culture

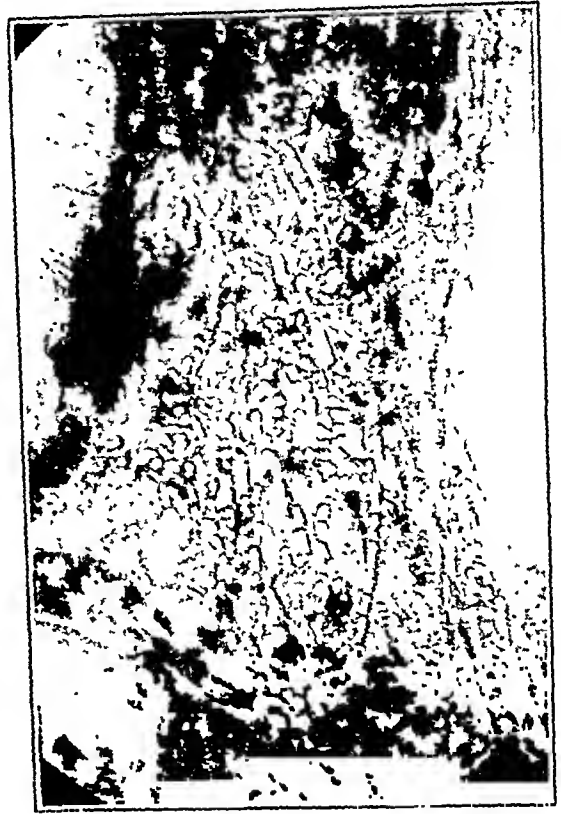


Fig. 4.—Infected hair from favic lesion of monkey (magnification $\times 320$).

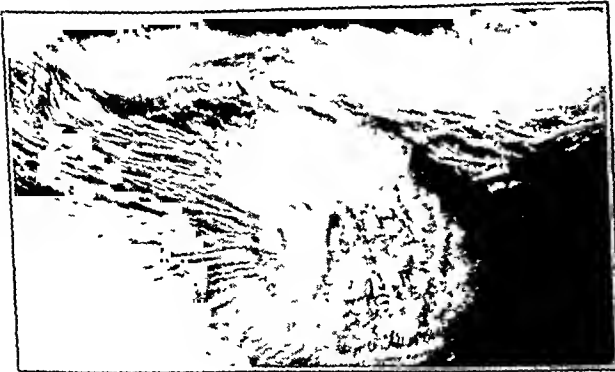


Fig. 3.—Favic lesion produced in monkey

colour on subculture was rubbed on a shaved area on the back. Infection took place in 10 days and developed further to a typical favic lesion (figure 3). In one month and eleven days

gave a cream-coloured growth of *T. violaceum* on Sabouraud's maltose-peptone agar.

Classification.—The generic name *Trichophyton* was originally used to include fungi which were considered to infect the hair only and did not spread on to the skin, but this distinction is no longer valid for, although the ringworm fungi all show certain preferences for either hair or epidermis, practically all of them have now been found to be capable of growing in both these structures; it is accordingly proposed to consider classification on a botanical basis, which is much more satisfactory than the clinical. If considered on the cultural appearances in Sabouraud's medium *T. violaceum* is seen to be really an *Achorion*, for on this medium it produces a faviform growth unlike the downy cultures of *Trichophyton*. Microscopic examination shows arthrospores, intercalary and terminal chlamydospores similar to those found in *A. schonleini*. Further support to this view is lent by the typical favic lesions we produced in one of our monkeys, and Georgjevic and Milochevitch (1935) record a case in a human being with favic scutula caused by *Trichophyton album*. Accordingly we consider *T. violaceum*

is more correctly classed as an *Achorion*, and we have also produced proof that violet or white colour is only a variation, so the name of this fungus with its synonymy is as follows:—

Achorion violaceum (Bodin, 1902).

Synonyms.—*Trichophyton violaceum* Bodin, 1902.

Trichophyton album Sabouraud, 1909.

Ectotrichophyton album Castellani and Chalmers, 1918.

Trichophyton glabrum Sabouraud, 1909.

Trichophyton (indicum) violaceum was identified as a variety by Acton and McGuire (1929) because it primarily infects the hair follicles on the limbs only rarely spreading on to the scalp, and cultures habitually show a much deeper violet than the ordinary species.

T. (decalvans) violaceum was distinguished by Castellani (1919) because of slight differences in the clinical appearance of the scalp infection from the usual type, but the cultural characters were practically identical with those of *T. violaceum*, therefore this is probably also a synonym of *A. violaceum*.

Summary

(1) The existence of *Trichophyton violaceum* (Bodin) is recorded for the first time in India.

(2) No other species of *Trichophyton* has been found during the course of this investigation.

(3) The cultural characteristics of this fungus have been described.

(4) It is suggested that on botanical as opposed to clinical characters this fungus would be more correctly classed in the genus *Achorion*.

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(Continued at foot of next column)

SOME OBSERVATIONS ON DERMAL LEISHMANIASIS

By R. O. A. SMITH, D.T.M., I.M.D.
and

K. C. HALDER, L.M.F.

(From the Kala-Azar Enquiry under the Indian Research Fund Association, School of Tropical Medicine, Calcutta)

SINCE Brahmachari described the first case in 1922 of this sequel of kala-azar, the number of cases presenting themselves for diagnosis and treatment has steadily increased. At the School of Tropical Medicine we now meet with an average of about 60 cases each year. A certain number of cases attend for treatment at other clinics and by private practitioners, but that a large number do not trouble to seek advice regarding their condition is made evident by the fact that many patients are noticed in the streets who do not seem to realize that anything is amiss with them—or, if they do, they do not attach any importance to the condition, especially in the early stages, when the disfigurement is not marked.

The early lesions cause no inconvenience to the patient whatever and it is only when the condition advances to the nodular stage, and there is a suspicion that the condition is leprotic or syphilitic, that many patients come for advice and for treatment. This is true of patients from the mofussil, the majority of whom present themselves with advanced forms of the disease, than of those from Calcutta itself, where the advantages of the skin clinic at the School of Tropical Medicine are made full use of; many early cases are seen in this clinic. The greater number of cases seen by us have been referred to us by the officers in charge of the leprosy and skin departments. This opportunity is taken of acknowledging their kind assistance.

A few cases are seen amongst patients treated for kala-azar at the outpatient department who present themselves for treatment for some febrile ailment which they think is a return of kala-azar, and they are not aware that they have skin lesions.

(Continued from previous column)

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DESCRIPTION OF PLATE XII

Trichophyton violaceum cultures.

- Fig. 1.—Three weeks' old culture from infected follicle.
- Fig. 2.—Three weeks' old culture in flask.
- Fig. 3.—Subculture showing violet centre with cream-coloured surrounding growth.
- Fig. 3a.—Cream-coloured primary culture.
- Figs. 4 and 5.—Cultures showing coloration of varying degrees of intensity, all from the same patient.
- Fig. 6.—Duvet formation in primary culture after a period of six weeks' growth.

Sandflies, *Phlebotomus argentipes*, are as easily infected by feeding on these dermal lesions as by feeding on cases of kala-azar and the fact that the organisms are identical renders this condition a very important one epidemiologically. Although the experiments to transmit *Leishmania donovani* to human volunteers by the 'bites' of infected sandflies, *P. argentipes*, have so far proved negative, the bulk of the evidence accumulated against these midges, and the fact that on four occasions at least *L. donovani* has been transmitted to hamsters by the 'bites' of infected sandflies, point very strongly to these midges as the natural vectors of *L. donovani* in man. The reasons why a larger percentage of experimental animals has not been successfully infected and also the failure in man have yet to be discovered.

The fact that dermal cases serve as a reservoir of *L. donovani* over long periods, and possibly all their lives if no treatment is taken for the cure of the condition, renders them a greater source of danger to their neighbours than cases of the visceral disease—where the patient either recovers under proper treatment, or if untreated most often dies in a definite space of time.

P. argentipes are most easily infected by feeding on the nodular lesions, but they can be infected fairly readily by feeding on the depigmented patches as well, and indeed the feeding of sandflies on such patches is a more certain means of diagnosis—if a definite diagnosis is needed—than either smear or culture from the part in question. By enclosing sandflies in a specially-made cage with 'holting' cloth these midges can be made to feed on any particular part of the body as required and a definite diagnosis made.

Mention may here be made of a class of nodular lesions where the cellular reaction seems to be far in excess of the parasitic infection and such nodules do not always show leishmania in smears when taken in the usual way. We have seen three cases of this nature—in one a diagnosis was made by feeding sandflies on the lesions; in the second by culture; the third was diagnosed clinically on the good response to the antimony treatment given.

That a certain number of cases act as carriers without showing any lesions in the skin is borne out by the fact that in one case at least, out of five where the experiment was done, infected flies have been obtained by feeding on the chin of a man who showed no obvious lesions, but who had had kala-azar two years previously. The sandflies were fed on the area round the chin and mouth for the reason that signs of dermal leishmaniasis often appear first on these sites and also because it was noted that the area round the waist, which is fairly constantly under pressure in Indians who wear 'dhotis', is very often not affected by dermal lesions, even when practically the whole of the trunk and

limbs are depigmented (figure 1). It was difficult to explain this feature except by the reason of the pressure which is applied fairly constantly both day and night over this area.

Use was made of this observation to test the value of a pressure bandage on an infected limb but though a certain amount of difference in pigmentation was noted in parts where the bandage was fairly firmly applied the results were not encouraging from a therapeutic aspect.

We have nothing to add to our present knowledge regarding the distribution of the lesions, the age, sex and caste of the patients presenting themselves for treatment. Our figures compare very closely with those reported

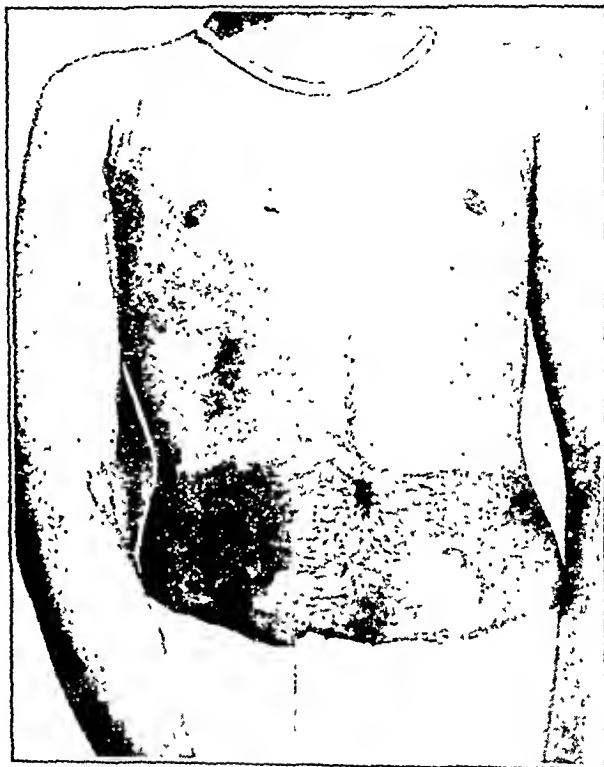


Fig. 1.

by Napier and Das Gupta (1930 and 1934) in their clinical studies of the disease.

We have had one case where the dermal and visceral lesions were present at the same time. The child in question had had two courses of one of the pentavalent compounds of antimony by private practitioners and when first seen was found to be very anæmic with a blood picture suggestive of pernicious anæmia. A blood culture and aldehyde test were done at the same time. The aldehyde test was weakly positive—but the blood culture showed many flagellate forms on the 12th day. The spleen was enlarged and so was the liver; the temperature was irregular. This case showed a certain intolerance to antimony—the first injection causing severe hepatic pain, a rise in temperature after 24 hours, and inflammation of the lips and

tongue. Treatment by grey powders internally, belladonna plaster over the liver and the injection of neostibosan every 4th day caused a complete cure of the visceral condition. A good improvement of the dermal condition was also found when the patient reported three months later.

We would, however, like to draw attention to certain types of the disease which we have seen in the past two years. Napier and Das Gupta (1934) have described seven clinical types of this disease. We would like to add a new one to this series, viz, a fibroid type. A photograph of such a case is given, figure 2 (a) and (b). Two other types which are really variants of the nodular form are worthy of mention—a leprous type and an ulcerative type.

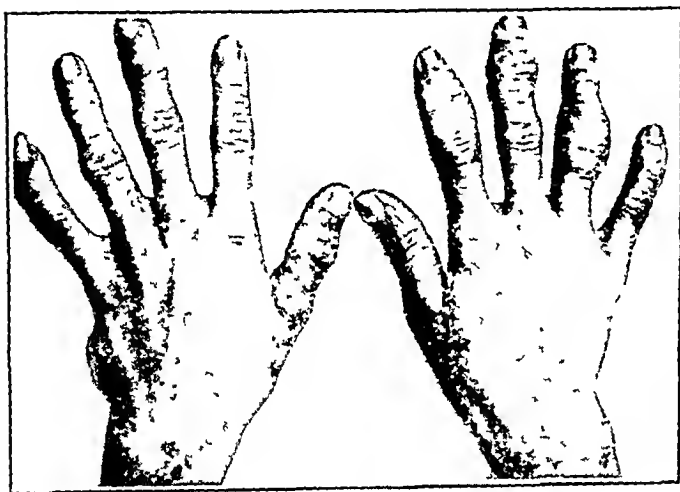


Fig. 2a—Fibroid type; before treatment

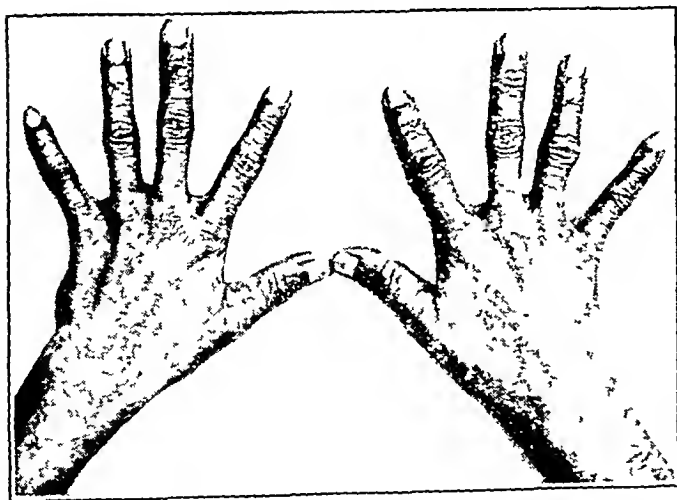


Fig. 2b—After treatment

(i) *Leprous type*.—The nodules in this form of leishmaniasis have often been mistaken for those caused by Hansen's bacillus before a correct diagnosis has been made, but the case whose picture is herewith appended is more like a case of leprosy than any we have yet encountered. He was treated with antimony and iodides, and made an excellent recovery as the picture after treatment shows, figure 3 (a), (b) and (c).

(ii) *Fibroid type*.—This type is not quite the same as the hypertrophic type described by Napier. When first seen, the thickening of the



Fig. 3a—Leprous type

phalanges suggested some form of dactylitis and an x-ray picture was taken to observe the condition of the phalanges; these were found intact and the swelling was confined to the soft structures. The only other lesion shown by this patient was slight erythema of the face, which might very easily have been overlooked, figure 2 (a) and (b).

(iii) *Ulcerative type*.—At least four cases were seen, one of which is depicted in figure 4 (a) where there was definite ulceration of some of the nodules. The parasites, *L. donovan*, were demonstrated from the borders of the ulcers in much the same manner as in *L. tropica* infections.

Figure 5 is also the picture of another case where there was a certain amount of breaking down of the nodular tissue which in this case was limited mainly to the nose. It is unfortunate that the patient who lived out of Calcutta would not stay in hospital or remain here for treatment after a diagnosis was made, so that the ultimate result of the lesion could not be traced.



Fig. 3b.



Fig. 3c.—Same man; after treatment.



Fig. 4a.—Before treatment.



Fig. 4b.—After treatment.

Lesions of the palate and mucous membranes have been mentioned by other writers on this



Fig 5.



Fig 6

subject; we have had one case, depicted in figure 6, of a definite muco-cutaneous ulceration. This patient as the picture shows had an ulcer on the lower lip and also two shallow ulcers of the dorsum of the tongue, one on either side of the middle line. *Leishmania* were demonstrated from the lip lesion but not from that on the tongue—which healed up spontaneously in a few days after admission to hospital, before any treatment other than iodides was given.

Treatment.—While antimony is indispensable in the treatment of this condition, we would like to mention the efficacy of potassium iodide as an adjunct to the treatment with the pentavalent compounds of antimony. The effect of a course of iodides before a course of antimony is most apparent in certain forms of nodular dermal leishmaniasis—particularly the leprous, xanthoma and fibroid types. The results in these cases are fairly rapid, the unsightly nodules clearing up rapidly in a few weeks. One case treated in the hospital showed very rapid improvement; in this case the effect of the iodides was to cause ulceration of the nodules in four places, and as soon as antimony was begun the lesions were seen to shrink from day to day.

The effect of potassium iodide is less marked in those cases with isolated nodules and in purely depigmented cases, but even in such cases our results have led us to believe that the lesions clear up quicker when treated with iodides and antimony than with antimony alone. We have tried various local applications on the purely depigmented lesions—such as liniment of iodine, trichloroacetic acid, oil of bouchi, and an ointment of berberine sulphate made up with a special base—with no improvement whatever.

Vaccine.—A vaccine made of flagellates was used in a few cases early in 1933, but the results were not encouraging and this treatment was given up.

The routine adopted was to treat each case with increasing doses of potassium iodide till symptoms of intolerance were noted or there was some change in the nature of the lesions; the iodide was then withheld and a course of antimony begun. A course of antimony consisted of 12 to 15 injections, making a total of 3 to 4 grammes of the drug. A second course of iodides and antimony was then given after a rest of two or three weeks and the patient told to report after a month so that we could observe the condition of his lesions.

It is unfortunate that many cases, mostly with purely depigmented lesions, do not respond readily to treatment as described above, and many of them cease attending before a cure has been effected, but our experience suggests that many of these cases do ultimately get cured if they have had the patience to take a sufficient amount of the drug.

In some instances where there were isolated nodules, we treated the nodules locally with injections of 2 per cent berberine sulphate. These

injections are painful and only one or two nodules could be treated at a time but the results

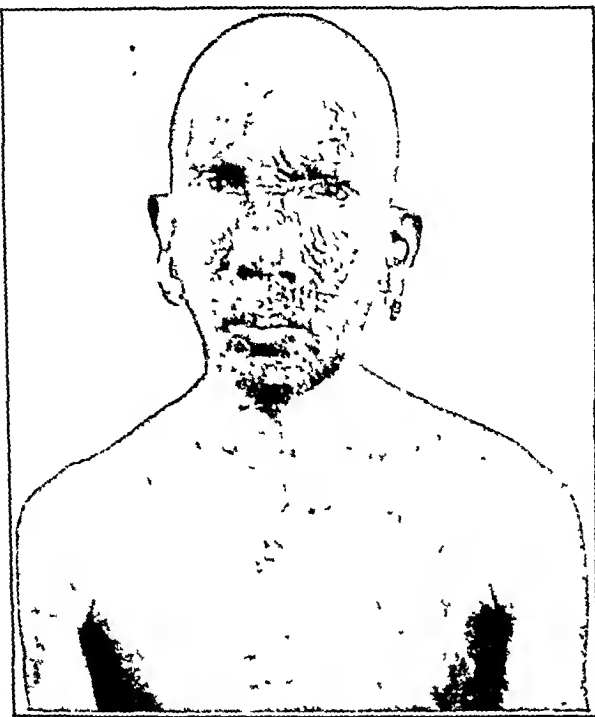


Fig 7a—Before treatment.

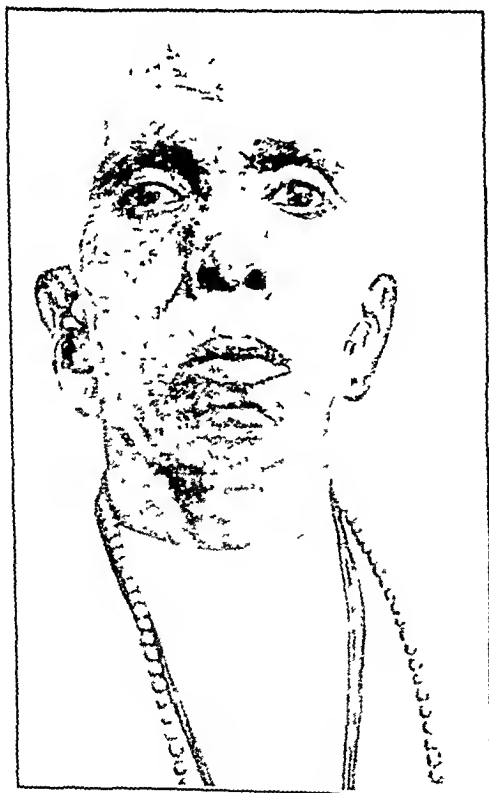


Fig. 7b.—After treatment.

are fairly certain; the nodule shrinks rapidly after the preliminary inflammation due to the

drug. It was suspected before that this local inflammation was also beneficial to the other lesions on the body for, after a few of the nodules have been treated in this way, depigmented lesions have been seen to resolve faster than when the antimony treatment alone was given. Further evidence to support this assumption was obtained in two cases; one of these came to us with ulcerated lesions, in the second the lesions ulcerated after the administration of potassium iodide, and both healed very rapidly after the administration of antimony.

Figures 7 (a) and (b) and 8 (a) and (b) are of cases before and after treatment, the former being a case passed on to us by Dr. L. E. Napier when he relinquished charge of the



Fig. 8a—Before treatment

enquiry, and the latter a case in which the effect of the iodides was to cause ulceration of these nodules preliminary to healing

Acknowledgment

Our thanks are due to Dr. L. R. Sharma for much assistance during his period of work with us and also to Dr. S. Mukerji and Jemadar Chiranji Lal for much practical assistance.

(Continued at foot of next page)

NERVE AND CORD DEGENERATION REFERABLE TO VITAMIN-A DEFICIENCY

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In 1933 I inspected a large number of prisoners in the jails of Ceylon for signs and symptoms of nutritional deficiencies. The results were reported in this journal (Nicholls, 1933). The conditions which were attributed to vitamin-A deficiency were:—a papular dry skin eruption (phrynoderma), night blindness, dimness of sight, xerophthalmia, keratomalacia, a lowered resistance to dysentery, and neuritis. The last was so common that a diagnosis of neuritis had been made during 1932 in the case of 41 patients admitted to the Colombo Prison Hospital, and 2,397 treated at the dispensary. At that time the diagnosis was accepted, but at a later date more careful clinical investigations

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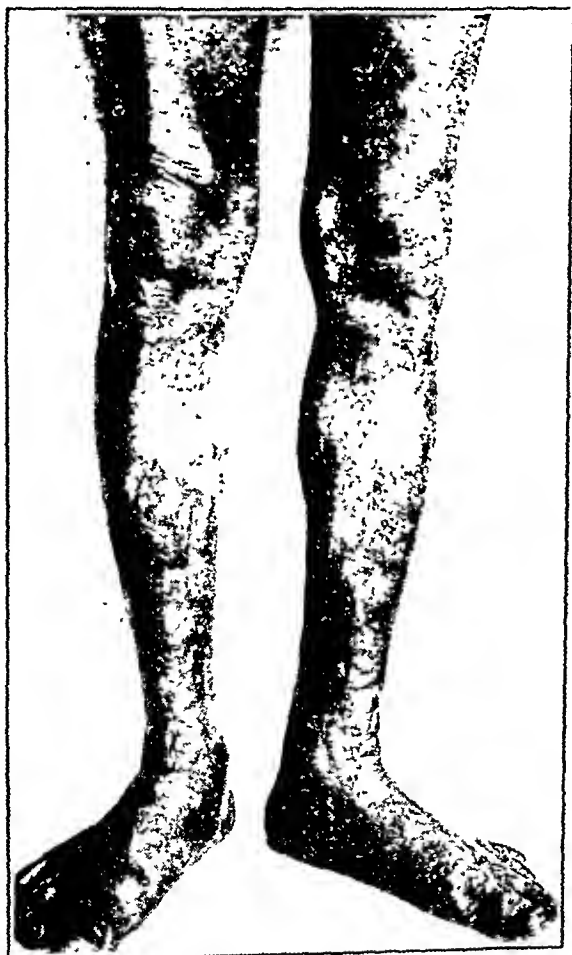


Fig. 8b.—After treatment.

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made this doubtful. There was considerable uniformity in the symptoms in the early stages. The patients complained of a burning sensation of the hands and sometimes of the feet, and numbness, tingling and weakness of the limbs. Many patients had pain when the muscles of the calves were squeezed. The reflex responses varied and were increased, normal or diminished. When the patients were placed on an improved diet recovery soon took place. A few patients developed what appeared to be a more advanced stage of the condition; and in these the clinical signs were so variable as to be bewildering, and when experienced physicians examined these patients they hesitated to make definite diagnoses and offered tentative suggestions such as:—progressive muscular atrophy of unusual distribution, 'neuritis', 'beri-beri', early 'tabes dorsalis' and 'a lesion of the pyramidal tract is suggested'. Most of the patients in the later stages recovered slowly in hospital. Therefore either the prisoners, the majority of whom were young men, were at that time particularly liable to paretic disorders from a variety of causes or one type of cause was producing a variety of paretic signs.

Signs of degeneration of nerve tissue in women in the later stages of pregnancy and during lactation have been recognized for many years in Ceylon as being far from a rare occurrence.

The early symptoms in these cases are similar to those described above for the prisoners, they start with burning sensations in the palms of the hands and sometimes also in the soles of the feet, there is tingling, numbness and muscular weakness of the limbs. Many patients do not have signs other than these, others develop mild degrees of paresis and ataxia. The great majority of the patients recover soon after childbirth. Occasionally the condition becomes worse during lactation and results in much paresis and ataxia. A few of these advanced cases are to be seen in the wards of the General Hospital in Colombo.

I selected two cases in the medical wards in the charge of Dr. P. B. Fernando, and he supplied extensive notes on them and has kindly given me permission to publish these. One case will be sufficient as it is typical of many, though not of all.

Notes on a case of paresis and ataxia of pregnancy

S. H., age 33, wife of a petty trader. Admitted on 7th March, 1935, when she was unable to walk and had loss of power in the arms and legs.

History.—Two and a half months prior to admission her sixth child was born; it was a normal delivery. Two months before the confinement she noticed numbness and tingling of both feet and hands. Gradually the numbness and tingling spread to the arms and legs. The condition became steadily worse after childbirth, and three weeks prior to admission to hospital she was unable to walk or even stand, and she could not work with her hands owing to loss of power and ataxic movements.

PLATE XIII



Fig. 1.

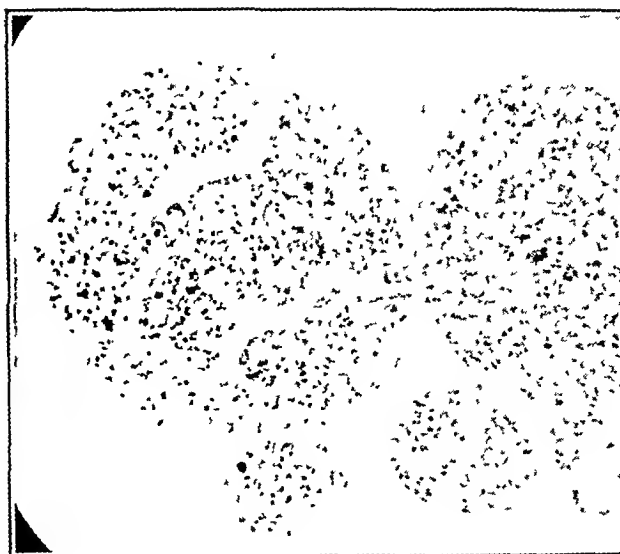


Fig. 3.

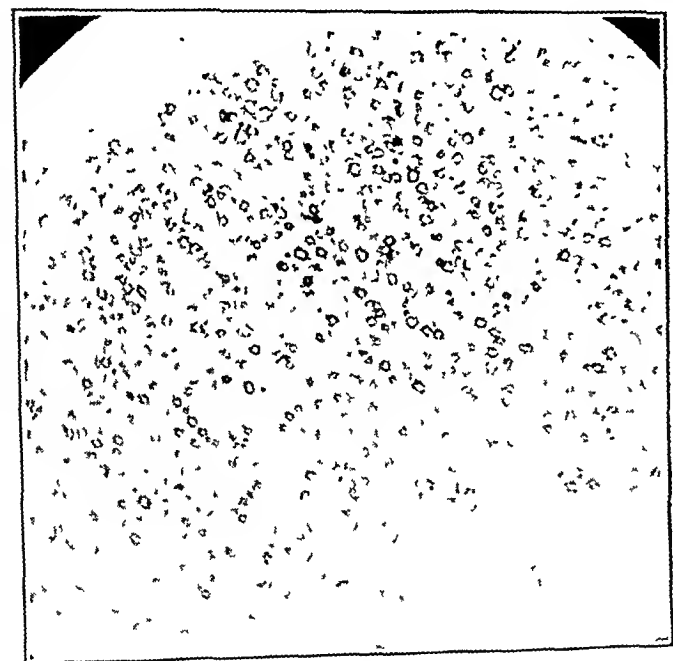


Fig. 2.



Fig. 4.

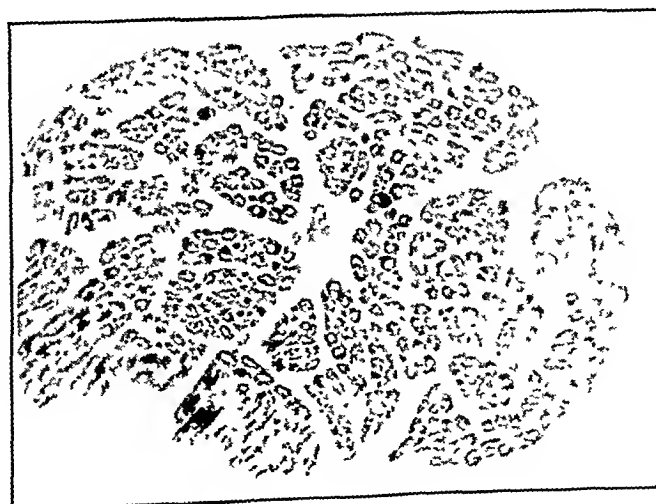


Fig. 5.

There was no history of venereal disease. She had had malaria and continued fever two years ago. Three of her six children have died, two of convulsions and one of typhoid fever.

Diet.—Her usual diet consisted of rice, vegetables, and fish. She took very small quantities of milk (just enough to flavour the tea). She stated that she never took meat, eggs, butter or ghee. For several months prior to the onset of the numbness she had been off food owing to the vomiting of pregnancy and was nearly starving herself. (There was no history pointing to lathyrism; lathyrus peas are not eaten in Ceylon.)

Clinical examination.—The patient appears well developed, there is no wasting, she had fever of 101°F. on admission. Rather anæmic.

Heart.—Limits normal. Harsh murmur over the base. Pulse volume fair.

Lungs.—Nothing abnormal.

Abdomen.—Spleen enlarged, liver enlarged, bowels regular.

Urine.—Specific gravity—1020; albumin and sugar—nil; deposit—pus cells (about 6 to a field) and uric acid crystals.

Fæces.—Ascaris, necator and trichuris ova present.

Blood.—Malarial parasites not found. Wassermann test negative. Erythrocytes 3,760,000 per c.mm. (on 8th April, 1935); reticulocytes 1.5 per cent, average size of red blood corpuscles 7.6 μ , leucocytes 5,800 (58 per cent polymorphonuclears and 42 per cent lymphocytes). Hamoglobin 75 per cent.

Mentality.—The patient is intelligent, she is not emotional and her speech is normal.

Cranial nerves.—All normal. Pupils react to light and accommodation; no nystagmus.

Motor system.—There is no wasting of the muscles. There is marked weakness of the arms and legs. Patient can raise the legs from the bed, but not against light pressure; her finger grip is weak; flexion and extension of the arms against pressure is very weak. Wrist drop and foot drop are present on both sides. The patient cannot stand or walk.

Sensory.—There was impairment of touch and discrimination of heat and cold over the dorsum of the feet and extending up to a little below the knees on the antero-internal aspect of the legs. Pin-pricks could be felt all over the limbs. The joint sense was lost, the patient being unable to state correctly which way the toe was bent. Romberg's sign was present.

Inco-ordination.—There was inco-ordination of movements of both arms, more marked on the left side as shown by the finger to nose test. There were coarse tremors of the hands and forearms as she attempted to use them.

Reflexes.—(a) Superficial:—

- (1) conjunctival, present and equal.
- (2) corneal, " " "
- (3) abdominal, " " "
- (4) plantar, flexor response.

(b) Deep:—

- (1) knee, absent.
- (2) ankle, "
- (3) biceps, "
- (4) triceps, "

Sphincter action was normal.

Cerebro-spinal fluid.—This was clear and was not under tension. Cells were not increased, sugar 56 mgm. per cent, chlorides 700 mgm. per cent. Proteins gave Nonne-Apelt—negative and Pandy's—weak positive. Lange's curve 00000012210.

Treatment.—The patient was given cod-liver-oil, and an iron mixture three times daily and marmite daily. Electrical treatment of the muscles was started on 22nd March.

In April the patient was given treatment for hook-worm infection.

Progress.—The condition of the patient slowly improved and on 10th May two months after admission the notes state 'Patient very much improved. Can walk about without assistance, muscle tone good,

inco-ordination and ataxia much less, but still present. Romberg's sign is still present. Superficial sensations—touch (cotton-wool) absent over dorsum of feet, but present over the rest of the legs. Heat and cold sensations have likewise returned over the legs but are still absent over the dorsum of the feet'.

Post-mortem material

The next necessary step was to obtain material for microscopical examination. But it became apparent that many years might elapse before post-mortems could be obtained on an adult, because the mortality rate among these patients is exceedingly low, and post-mortems are not easily obtained in Ceylon.

E. Mellanby (1926 and 1934) has shown that when young dogs were fed on diets deficient in fat-soluble vitamins they develop inco-ordination of movements, and when sections of their cords are stained by Marchi's osmic acid method varying degrees of demyelination of the nerve fibres are revealed.

The death rate among young children of the lower classes in Ceylon is high and malnutrition, marasmus and debility are the causes of death which are returned for many of these.

Signs of vitamin-A deficiency such as keratomalacia and phrynoderma are common in these marasmic children (Nicholls, 1934). A clinical examination for signs and symptoms of nerve degeneration in these children was carried out and found to present great difficulties, because these children are very irritable and any handling produces crying and writhing, and this is increased when the muscles of the calves are gently squeezed, so that there is little doubt that this causes pain; but satisfactory examinations for reflex responses could not be made, even in cases where there was advanced weakness and atrophy of the muscles.

A considerable number of post-mortems have been obtained on young children, and eight of these children had shown signs of vitamin-A deficiency during life.

Pending the permission of the parents for the post-mortem it was necessary to prevent changes in the cords, and therefore 50 c.cm. of 10 per cent formalin in normal saline was injected intrathecally into each child. This was done in the first cases, but later with the assistance of Dr. O. C. Hill (Professor of Anatomy) the whole body of each child was injected through the femoral artery. These procedures were found to preserve the cords in good condition. The assistance of Dr. E. K. Wolff (Professor of Pathology) was obtained for the preparation of many of the sections. Marchi's osmic acid method was used for all the sections.

A post-mortem was made on a child aged 2 years, who had a history and showed signs of malnutrition and had died of a terminal broncho-pneumonia.

A piece of the spinal cord was removed with the posterior and anterior roots attached, sections were cut and stained; figure 1 (plate XIII)

is taken from a section of the posterior nerve roots; it shows a few degenerated nerve fibres especially in the upper right-hand quadrant of the photograph. A section of the cord of this child was searched but markedly degenerated nerve fibres were not found; figure 2 (plate XIII) is from the posterior columns. These serve as a contrast for sections (which were prepared at the same time) of nerve roots and cords, which showed much more advanced nerve fibre degeneration.

A post-mortem examination was done on the body of a child aged 2½; the cause of its death had been returned as marasmus. The body was emaciated, there was phrynodermia of the skin, and early signs of keratomalacia. The heart and lungs showed no signs of disease; the liver, spleen, kidneys and intestines were more or less normal, and the examination did not reveal any definite cause of death. Sections of the posterior nerve roots showed numerous nerve fibres in various stages of degeneration; and sections of the cord showed many degenerated fibres. The degeneration was most marked in the posterior columns but was not confined to them, degenerated fibres were seen to be scattered throughout the lateral and anterior columns. The anterior roots also showed some degenerated fibres. Figures 3 and 4 (plate XIII) are from the posterior roots and the posterior columns, respectively.

The posterior nerve roots and posterior columns of the cords of all children who had shown signs that were attributed to vitamin-A deficiency had degeneration of about the same degree as that shown in plate XIII, figures 2 and 4. And also in all cases the anterior roots and the lateral and anterior columns showed degenerated fibres.

But two children who had not shown during life any definite signs of vitamin-A deficiency, though it does not follow that they were not suffering from this deficiency, had a fair degree of degeneration of the nerve roots and cords. One of these had been diagnosed in life as suffering from malnutrition and had died with a terminal diarrhoea. The other had 'nutritional oedema'; figure 5 (plate XIII) is from a section of the posterior nerve root of the latter.

Discussions.—Mellanby has fairly definitely established the fact that some amount of the fat-soluble vitamins is necessary in the diets of dogs for the health of their nervous systems. The poorest classes of the teeming East live on diets which are definitely deficient in vitamin A, and when greater strains are thrown upon the metabolism as when women are pregnant, prisoners are placed on penal diets, and children are weaned on cereals and a few coarse vegetables, signs and symptoms of degeneration of the nervous system are to be expected among them.

It is seldom that a mean diet is deficient in only one food factor; but in primary aetiological

enquiries it is necessary to dwell largely upon the most salient deficiency and, although it is suggested that vitamin-A deficiency is the cause of the symptoms, signs and microscopical appearances of nerve fibre degeneration described here, it is not suggested that other deficiencies or even neurotoxins may not play a part in some cases.

It is widely accepted that a deficiency of vitamin B₁ is the main aetiological factor in beri-beri; but most observers consider that other factors such as neurotoxins or other dietary defects may have an ancillary or even determinative action. Mellanby (1934) considers that although a deficiency of vitamin B plays an important part in the aetiology of beri-beri yet it is a deficiency of vitamin A which causes the polyneuritis. A point in favour of this is that outbreaks of beri-beri are particularly liable to occur among gangs of labourers and others who cannot afford comestibles of animal origin rich in vitamin A, and they are usually away from access to fresh garden produce. But beri-beri, showing the usually accepted signs and symptoms, is very uncommon in Ceylon, where vitamin-A deficiency is rife.

It may be that beri-beri and such conditions as the paresis and ataxia of pregnancy are closely allied and the signs, symptoms and distribution of the nerve fibre lesions are determined by the relative deficiencies of vitamins A and B₁ (and perhaps others) in the diets; in which case they fall into a natural group characterized by more or less subacute combined degeneration in which complete regeneration may take place.

The lack of uniformity of the symptoms and signs among the prisoners was doubtless due to different nerves and columns of the cords being affected to varying degrees.

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DESCRIPTION OF PLATE XIII

- Fig. 1.—A section from the posterior nerve roots, showing a few degenerated nerve fibres, especially in the upper right quadrant of the photograph; from a child, aged 2 years, dying with evidence of malnutrition.
 Fig. 2.—A section from the posterior columns showing slight evidence of nerve-fibre degeneration; the section provides a contrast to figure 4.
 Fig. 3.—A section from the posterior nerve roots showing numerous nerve fibres in various stages of degeneration; from a child, aged 2½ years, dying from marasmus, showing clinical evidence of vitamin-A deficiency.
 Fig. 4.—A section from the posterior columns showing many degenerated nerve fibres; from the same child as figure 3.
 Fig. 5.—A section of a posterior root of a child who had 'nutritional oedema' before death.

LUMBAR SYMPATHECTOMY IN THE TREATMENT OF CIRCULATORY DISEASES

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TELFORD and STOPFORD (1935) state that 'whilst cases of onychia have showed rapid healing, the outlook for sympathectomy when gangrene is actually present is not good. The operation is hardly worth while, excepting that a sympathectomy may render it possible to amputate at a lower level than the customary above-the-knee operation.

Many of the patients suffer from wellnigh intolerable "rest-pain" which causes a rapid depreciation of their general health. In such cases it is well worth while to consider a sympathectomy even if the vascular condition of the limbs offers but scanty hope of success as regards function. The relief of pain after the sympathectomy is often complete and we have found this one of the most striking and gratifying results of the operation.

I feel that there is, in India, room for a more extensive use of lumbar sympathectomy in the treatment of cases of gangrene in the initial stages of the disease and in those cases where the first evidence of vascular disease is the appearance of an onychia or a trophic ulcer.

To say that vasospasm is but an incident in the disease and that the underlying pathology must negative any permanent benefit, and to leave it at that, is simply to deny to the sufferer the benefit which surgery offers to him.

If however we in India pick out only those cases that show some improvement in circulation, as measured by surface temperature after inoculation with T. A. B. vaccine or after the administration of a spinal anæsthetic, then we shall miss many suitable cases. In India, when and where the room temperature approximates and often exceeds body temperature, Brown's vasomotor index is of little use for the purpose of selecting cases. The temperature of the limb in which vasospasm exists approximates room temperature, and the rises in the mouth and limb temperatures after inoculation with the vaccine will then be approximately the same, though granted that in the case of the affected limb the rise may be delayed.

After spinal anæsthesia the temperature of the feet as recorded by a surface thermometer is said to rise from 5°C. to 8°C., but this does not occur in India where a rise of 1° or 2°C. is all that can be expected.

The following results are typical of what happens, at least during the warmer weather in Madras :

TABLE

Showing temperature in degrees centigrade before and after administration of spinal anæsthetic, 17 c.cm. of novocaine, 1 per cent

	Before	After	Before	After	Before	After
Mouth temperature.	36.6°	36.6°	37°	37°	36.8°	36.8°
Limb temperature.	34°	35°	34°	34°	33°	35°
Ward temperature.	34°	34°	33.5°	33.5°	34°	34°
Age of patient in years.	55		35		30	

The environmental temperature test could of course be made use of with more accurate results.

It is interesting to note that Ito and Asami, who arrived at the idea of treating vasospastic diseases by ganglionectomy, found their patients amongst the field workers of Japan. There, as in South India, the former is subject to long continued exposure standing in water planting rice during the rainy season.

Before the stage when 'trophic' ulceration appears there is a period when, if the patient were seen, he would complain of cold, dull, aching feet, perhaps with some slight degree of cyanosis. These are the cases which can receive great benefit by operation, not those, such as we at present see, that already have suffered for perhaps years with pains in the legs on walking and have lost parts of toes, perhaps several toes, from local spontaneous gangrene, and the treatment of which ends in amputation of the affected limb. The cases where the pulsation in main arteries is still present are those which will do well after a sympathectomy. That even late cases can benefit in some degree from a lumbar sympathectomy is evidenced by the medical histories of three cases operated upon within the last four months.

Case 1.—Male, aged 33 years; admitted with gangrene of the second toe of the right foot.

Two and a half months ago he began to suffer from excruciating pain in the second toe of the right foot, the pain extending up his leg and interfering with sleep. The patient got relief from pain by hanging his leg over the edge of the bed, in which position he now always sleeps.

Local condition.—Right foot cold, cedematous; the second toe is black and the skin on the dorsum has peeled off. The toe is very tender to the touch.

The femoral pulse is felt on both sides but is very feeble.

The popliteal and posterior tibial pulses on the right side are not felt.

Temperatures before and after T. A. B. inoculation

	Before	After
Right thigh	.. .. 34°C.	37°C.
Right foot	.. .. 29°C.	34°C.
Mouth	.. .. 36.4°C.	38.5°C.

Operation.—On 13th February, under open ether, incision made on right side as for exposure of the ureter. The sympathetic chain was readily demonstrated and numbers 1 to 4 lumbar ganglia with the intervening chain resected.

After operation but on the same day the temperatures were:—

Thigh—36°C.
Foot—34°C.

On the 16th February, these were the same.

On the 23rd February, the patient stated that the pain in the leg had gone, but that pain in the gangrenous toe persisted to some extent, and as the toe was separating very slowly it was amputated and the patient discharged on the 16th March, 1935.

The pulse did not return in the posterior tibial artery, but with improvement in collateral circulation relief was very marked. In the region of the gangrenous toe, where degenerative changes had occurred in the vessels, improvement could not be expected.

Case 2.—Male, aged 25 years; admitted to hospital on the 5th March, complaining of pain in the left great toe and of an ulcer, which refused to heal, on the same digit.

The condition commenced five months ago, the pain being severe enough to keep him awake at night. Soon after the onset of pain an ulcer appeared on the dorsum of the great toe. The pain became progressively worse and the ulcer spread to such an extent that the terminal phalanx of the toe had to be removed in the outpatient department on the 3rd March.

Though a Mohanmedan, he gave a history of smoking 5 or 6 cigarettes a day. He denied any addiction to alcohol and there was no history or evidence of venereal disease.

The region of the ulcer was exquisitely tender to the touch; pulsation in both femorals was vigorous, in the popliteals feeble, and in the posterior tibial and dorsalis pedis absent. Urine was normal. Blood sugar 0.083 per cent. Wassermann and Kahn—negative.

Temperatures before and after T. A. B. inoculation

	Before	After
Left foot	32.5°C	36°C.
Mouth	36.4°C.	39.4°C.

Operation.—On the 18th March, under open ether, a kidney incision extending from the angle of the ribs with the erector spinae to one inch in front of the anterior superior spine was made.

The exposure was not so good as with the 'ureter' incision of the first case and the demonstration of the various branches of the sympathetic was not so easily carried out.

After operation, but on the same day, the temperatures were:—

Left foot—32.5°C
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SOME UNUSUAL ACUTE ABDOMINAL CONDITIONS

By P. N. RAY, B.A., M.B. (Cal.), F.R.C.S. (Eng.)
Honorary Junior Visiting Surgeon, Medical College
Hospitals, Calcutta

It is intended in this paper to consider a few acute abdominal conditions that the practitioner may encounter and to record a few examples of conditions, some of them unusual, that demand immediate surgical intervention, but the writer does not propose to deal comprehensively with this very important subject.

I. Strangulated herniæ

The classical injunction to examine all the hernial orifices first in cases of acute intestinal obstruction is still unfortunately very often forgotten. It is necessary to remember that a strangulated external hernia is the ætiological factor in nearly 50 per cent of all cases of intestinal obstruction. Neoplasms are responsible for 10 per cent, with bands and adhesions, intussusceptions and volvuli coming next in frequency (McIver, 1932). What is very regrettable, is the frequent injudicious use of

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Temperatures before and after T. A. B. inoculation

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Here one was faced with a case presenting no single indication for a lumbar ganglionectomy. Even if the vasomotor index were valueless yet one could not get over the fact of a pulsating posterior tibial artery. The patient however insisted that an operation be done to heal his ulcer, and when it was pointed out to him that the operation must be an abdominal one he still insisted.

Operation.—With some misgiving, on the 17th June, I performed a lumbar ganglionectomy, under spinal anaesthesia, exposing the chain through the ordinary kidney incision. The exposure was excellent and the ganglia and intervening cord were easily dissected out.

On the 2nd July the ulcer on the plantar aspect of the left great toe had completely healed and the patient was discharged.

One concludes, therefore, that if treated early and by a bilateral ganglionectomy, because the disease is bilateral, much benefit would accrue to these patients; though the benefit would not be lasting, yet a longer period of useful life would be opened to them, and, further, one would suggest that in India the decision to operate be based on clinical findings and not on tests designed to prove that vasospasm is present.

REFERENCE

Telford, E. D., and Stopford, J. S. B. (1935). *Brit. Med. Journ.*, Vol. I, p. 863.

taxis, which may end in a tragedy. The following case provides an apt illustration:

Case I. Reductio en masse and rupture of sac:—

A male patient, aged 26, was admitted into the hospital for an acute abdomen. The history was as follows: the patient had a reducible right inguinal hernia for many years. Three days ago, it suddenly became irreducible, giving rise to severe abdominal pain and vomiting. It was, however, reduced by manipulation. Since then, he had been suffering, in addition, from absolute constipation. On local and rectal examination, a tense cystic swelling was found to occupy the right iliac and hypogastric regions. The seriousness of the condition was discovered during the operation. The hernia was found to have been reduced *en masse* and through a tear in the inner and posterior part of the sac, several coils of gut and omentum had escaped into the pelvic cavity, which contained a quantity of sero-anguineous fluid. A small perforation was present in a loop of gut contained within the sac and it was repaired without any difficulty. The patient made a satisfactory recovery.

The incidence of *reductio en masse* is about 0.6 per cent and it has a mortality of nearly 75 per cent, as a resection will be necessary in most cases (Frankau, 1931). In the present case, probably the rupture of the sac prevented extensive gangrene of the strangulated gut.

Case II. Simultaneous strangulation of femoral and inguinal hernia:—

A male patient, aged 32, was admitted into the hospital with a strangulated hernia. The clinical history was obtained that he was subject to an irreducible right inguinal hernia for many years and that he had two previous attacks of intestinal obstruction, which cleared up after administration of enemata and a few days of rest in bed. On local examination, a very large and tense irreducible inguinal hernia was noticed on the right side. Another small tender lump was present in the femoral region and was diagnosed as an irreducible femoral hernia. Lothiesen's incision was made and when the inguinal sac was opened, the femoral hernia happened to be spontaneously reduced. The contents of the inguinal sac were carefully examined, the coils of small intestines were found to be healthy, but adherent omentum was excised. The peritoneum was opened and the contents of the femoral hernia were carefully looked for. A knuckle of gut was discovered, showing the crescentic anemic impression of a Richter's hernia. The patient made an uneventful recovery.

Such cases are fortunately very rare. In a series of 1,500 cases of strangulated hernia, one case was reported by Frankau (*loc. cit.*) in which strangulation had occurred in both the femoral and inguinal hernia. It is possible but not certain that the previous attacks of obstruction in this case were due to obstruction or strangulation of the femoral hernia. The radical operation was performed for both the conditions, i.e., a Bassini's operation was combined with Lothiesen's.

Internal strangulation.—We are familiar with the many varieties of this condition—by bands or adhesions, or into the various peritoneal fossae. The following case may be worthy of record:

Case III. Hernia into the inferior ileo-caecal fossa:—

The patient, aged 35, a chauffeur, was recently admitted into the Medical College Hospital for acute intestinal obstruction. The history was as follows: the patient had a reducible right inguinal hernia of

many years' duration; a few hours previous to his admission into the hospital, he was nearly involved in a motor accident. He had to pull his car up in an emergency and as a result he was somewhat shaken; he was seized with severe abdominal pain, although he noticed that his hernia had been spontaneously reduced. On local examination, a tense fluctuant swelling was found to occupy the right iliac and hypogastric regions, the inguinal canal was clear, but there was no impulse on coughing. On abdominal section, a tense and strangulated internal hernia was discovered, occupying the inferior ileo-caecal fossa. Some difficulty was experienced in its reduction but it was possible to obliterate the cavity by means of interrupted catgut sutures. The patient made an uneventful recovery.

The occurrence of internal strangulation is not rare after abdominal injuries, but the present case is certainly of a very unusual type. The sudden strain of pulling up a speeding automobile would give rise to sudden contraction of the abdominal muscles. It is therefore conceivable that the forcible descent of some more coils of gut might easily give rise to strangulation of the hernial contents. On the contrary, it would be very difficult to explain in this case the mechanism of the spontaneous reduction of the inguinal hernia and the simultaneous occurrence of an internal hernia with immediate strangulation.

II. Acute perforation of peptic ulcers

In the management of emergencies in connection with gastric and duodenal ulcers, a great deal of difficulty has to be encountered at all times. As a rule, these cases come under the generic term of 'bad surgical risks', particularly in this country, because the patient is seldom taken to the hospital at an early stage. Clinically, acute perforation is characterized by the sudden onset of acute abdominal pain, especially in the epigastrium, associated with board-like upper abdominal rigidity. Clinically, three stages can usually be distinguished. The *first stage* is often regarded as one of shock, but shock does not usually supervene within an hour or two of the occurrence of the perforation. There is neither any increase of pulse rate nor fall of blood pressure. This stage may therefore be correctly described as that of prostration (Moynihan, 1926). It may completely pass off within a few hours. This painless interlude may be aptly described as the *stage of delusion* and may give rise to serious difficulties in diagnosis. The *third stage of peritonitis* sets in within 18 to 24 hours. It may be impossible to make a correct diagnosis in every case owing to (1) a good history not being available, (2) the site and character of the initial pain having been missed, (3) the unreliability of the obliteration of liver dullness, and (4) omission of a rectal examination. Careful and systematic percussion may be of the greatest value in such cases. Starting over a part that is obviously not tender, e.g., the thorax, percussion is carefully conducted towards the epigastric region. Deep perc. is resorted to if no tenderness is elic.

Operation.—On 13th February, under open ether, incision made on right side as for exposure of the ureter. The sympathetic chain was readily demonstrated and numbers 1 to 4 lumbar ganglia with the intervening chain resected.

After operation but on the same day the temperatures were:—

Thigh—36°C.
Foot—34°C.

On the 16th February, these were the same.

On the 23rd February, the patient stated that the pain in the leg had gone, but that pain in the gangrenous toe persisted to some extent, and as the toe was separating very slowly it was amputated and the patient discharged on the 16th March, 1935.

The pulse did not return in the posterior tibial artery, but with improvement in collateral circulation relief was very marked. In the region of the gangrenous toe, where degenerative changes had occurred in the vessels, improvement could not be expected.

Case 2.—Male, aged 25 years; admitted to hospital on the 5th March, complaining of pain in the left great toe and of an ulcer, which refused to heal, on the same digit.

The condition commenced five months ago, the pain being severe enough to keep him awake at night. Soon after the onset of pain an ulcer appeared on the dorsum of the great toe. The pain became progressively worse and the ulcer spread to such an extent that the terminal phalanx of the toe had to be removed in the outpatient department on the 3rd March.

Though a Mohammedan, he gave a history of smoking 5 or 6 cigarettes a day. He denied any addiction to alcohol and there was no history or evidence of venereal disease.

The region of the ulcer was exquisitely tender to the touch: pulsation in both femorals was vigorous, in the popliteals feeble, and in the posterior tibial and dorsalis pedis absent. Urine was normal. Blood sugar 0.083 per cent. Wassermann and Kahn—negative.

Temperatures before and after T. A. B. inoculation

	Before	After
Left foot ..	32.5°C	36°C.
Mouth ..	36.4°C.	39.4°C.

Operation.—On the 18th March, under open ether, a kidney incision extending from the angle of the ribs with the erector spinae to one inch in front of the anterior superior spine was made.

The exposure was not so good as with the 'ureter' incision of the first case and the demonstration of the various branches of the sympathetic was not so easily carried out.

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three effective motions. Paralysis of the intestines occurred subsequently but with the onset of peritonitis.

IV. Volvulus

The two following cases of volvulus appear to be sufficiently unusual to merit record:

Case VII. Compound volvulus of caecum and jejunum:—

The patient, a man of 22, was admitted into the hospital for acute intestinal obstruction of three days' duration. The pain was, at first, mainly complained of near the umbilicus, but after a few hours, with increasing distension, it spread all over the abdomen. On abdominal examination, a definite fluctuant resonant tumour, measuring nearly 9 inches by 5 inches, was found to occupy the left half of the upper abdomen. A high paramedian incision was made on the left side and an enormously ballooned coil of the large intestine was discovered. It proved to be the caecum and the proximal part of the ascending colon. It was necessary to puncture the gut before it could be untwisted. On either side, there was an irregular peritoneal tear measuring about 6 inches in length, but owing to the presence of an unusually long mesentery with which the caecum was provided, these were completely peritonized without any difficulty. It was further discovered that the volvulus was entwined with a distended coil of jejunum, which occupied the right iliac fossa. The patient made an uneventful recovery.

Volvulus of the caecum is far commoner than is generally considered, but a compound volvulus of the caecum and jejunum is certainly rare. It is not uncommon for the distended caecum to travel upwards and to the left, behind the root of the mesentery and towards the spleen. In this instance, it occupied the left lumbar and hypochondriac regions and resembled an enlarged cystic kidney. The distended jejunal loop occupied the right iliac fossa. After peritonizing the linear peritoneal tears and insertion of three layers of Lambert's sutures, the mobility of the caecum was limited to such an extent that no further plication or fixation was deemed necessary.

Case VIII. Sigmoid volvulus containing a tapeworm:—

The patient, an old man of 64, was admitted into the hospital for acute intestinal obstruction of five days' duration. On examination, the patient looked very ill and emaciated, and the abdomen was enormously distended. After abdominal section, the distended coils of gut were untwisted with some difficulty. I discovered a definitely palpable elongated band within the lumen of the gut along its long axis. Sigmoidostomy was performed and it was found to be a tapeworm. A Jaque's catheter (no. 12) was tied in. The patient made an uneventful recovery. The catheter came out on the fifth day, and the sigmoidostomy closed spontaneously. It is of interest to note that the tapeworm was not expelled during the post-operative period. Presumably it survived the strangulation. Having narrowly escaped three major calamities, *viz*, the great earthquake, the monsoon floods, and the volvulus at the age of 64 and all within the brief period of 9 months, the patient, a firm believer in fate, refused to bother about the lesser evil of a tapeworm. He was anxious to go back and build up a new home. He was accordingly discharged at his own request.

The discovery of a tapeworm is of rare occurrence in emergency abdominal surgery. The patient, being a Mohammedan, would not touch

pork; the worm was, therefore, presumably a *Tania saginata*. It is not improbable that the parasite was mainly responsible for the causation of the volvulus. The survival of the parasite in a volvulus of five days' duration is of interest. Sigmoidostomy was performed for the inspection of the parasite during the operation, relief of distension and prevention of subsequent recurrence of the volvulus.

V. Acute abdomen in children

It is not necessary to emphasize the gravity of acute abdominal conditions in infancy and childhood. Apart from intussusception, acute appendicitis may be justly regarded as the most important abdominal lesion in childhood. In my experience, the former is nearly four times as frequent as the latter in children under 3 years of age.

(a) *Acute appendicitis*.—The classical signs and symptoms may be present in acute appendicitis in children, but, if these are rigidly insisted upon before making a diagnosis, many serious cases will be missed, because abdominal rigidity and changes in pulse or temperature may be absent and the history may be misleading. The greatest difficulty may be encountered in the pelvic or high appendix. Tenderness on rectal examination and suprapubic pain in the former are significant points. The high appendix may simulate gastro-enteritis or duodenal ulcer. Even the greatest clinician is apt to be at fault in such cases. What is true of the adult patient is equally true of the child: patients never died of appendicitis, they died of its treatment (Moynihan, 1933). All acute appendicitis is obstructive, and if no aperient treatment were given no case would ever become really active. There was never a gangrenous perforated appendix, in which an aperient had not been given. Unfortunately, in our experience, it is an exception to see a child, who has not been given one or more purgatives, before he is brought to the hospital for operative treatment. Lord Moynihan (1933) is of opinion that no child should be left alone with his appendix for half an hour. Whatever the surgeon might feel about the prognosis, he must inevitably and without exception operate, if an aperient had been given. If not, the best conditions might be sought even at the price of some delay. In every case treatment whether medical or surgical must have its basis in a just appreciation of pathology. Without this appreciation the best technique may fail (Ryle and Rayner, 1932). If the surgeon is wrong and finds that he has removed a normal appendix, the mortality should be *nil* (Crymble, 1935). In doubtful cases, where basal pneumonia, pleurisy, or pneumococcal peritonitis is suspected, it is advisable to wait until the diagnosis is cleared up.

(b) *Pneumococcal peritonitis*.—Fortunately pneumococcal peritonitis is a rare condition. It

Therefore in the low plains during the hot weather not a single case of fresh infection of the human host can or does take place, and every one that is seen is the relapse of a previous infection at another season. Similarly, in the high hills also there can be no fresh cases of human infection, and the few that occur are relapses due to the cold.

While there is thus no new malaria in the hot months either in the low plains or high hills, in the intervening area matters are different and there is some fresh malaria. One finds an ever-decreasing relapse rate and an increasing new human infection rate, as one ascends from the low plains to the high hills; this depends wholly or partly on the rate of infection in the mosquito increasing up to a point in the area where the physical conditions (of which a moderate temperature is most important) are at an optimum (these conditions approximating to those of the low plains during the cold weather as mentioned above).

A little evidence on the matter is available. Thus (a) Strickland, Chowdhury and Chaudhuri (1933) found a natural sporozoite rate of 3.66 per cent during April and May in wild mosquitoes at Siliguri at the foot of the hills, a condition unlike that of Calcutta with a sporozoite rate of zero at this season; and (b) at Ambootia near Kurseong at about 3,000 feet, as the annual epidemic is in April and May while there are only sporadic cases in September and October, one can take it that the April and May infections are original infections and not relapses. There is thus in the intervening area a definite infection at this season, and generally speaking the 1,600-foot line appears, from a survey of the epidemic seasons in different places in the low valleys, to be that up to which original infection is increasing in the hot spring months and above which it decreases.

Now, while, as stated above, in the low plains November to January is the season of greatest infection in the mosquito, September and October being the months when the greatest numbers of new human infections are taking place, in the high hills there are no cases of new infection, so at this season there is a gradual decline in the infection rate all the way from the low plains up into the hills.

Travellers in the hills then in the spring (the hot months of the low plains) should keep as low in the valleys as possible until they can dash up over the 1,600-foot line and as high as possible. In the autumn (at the end of the rains) they should keep up as high as possible all the time.

As for new settlement, the site of election should be as high above 1,600 feet as possible.

Summary

All cases of malaria during the hot months in the low plains are relapses, or a manifestation of an earlier infection, probably due to

heat, while at this season in the low hills they are, at any rate in part, primary infections: in the high hills the few cases arising are relapses probably due to cold. At this season then the lower the altitude the less the chance of infection, but this only applies to the tract below about the 1,600-foot contour, which is the putative line of greatest infection: above this line the infection rate declines owing to increasing cold.

The primary infections in the spring in the low hills rarely relapse in the cold weather, confirming the experience of the benefit of sending 'malaria cases' to a cold climate. Apparently excessive heat is the usual cause of relapse.

In the autumn months (as one ascends from the low plains up to the high hills) there is a gradual decline in the fresh infection rate, owing to the increasing cold increasingly inhibiting the infection of mosquitoes and their development.

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A Mirror of Hospital Practice

A CASE OF MINOR EPILEPSY (*PETIT MAL*) DUE TO CEREBRAL TRAUMA

By OWEN BERKELEY-HILL
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Ranchi

L. J. J. MUSKENS, in his noteworthy book on epilepsy, observes that traumatic epilepsy falls into a special group among the epilepsies. Further, he calls attention to a very important point in connection with so-called traumatic epilepsy, namely, that one should be very cautious in ascribing the fits to a cranial injury even when a definite scar exists on the head of the patient in the left parietal region. Muskens would go so far as to advise against any diagnosis of epilepsy due to trauma except on the evidence of a skiagram or an actual operation or a *post-mortem* examination. Only in such circumstances as these, Muskens believes, is one justified in attributing epilepsy to a head injury.

The following case is interesting from the ætiological standpoint because the disturbance

of the cerebral function of the patient was definitely established by a surgical operation which was performed with the view of relieving the fits.

The patient is a girl (Anglo-Indian), aged 18. She is the eldest of three children. She was a full-time child and was healthy at birth. Labour was normal. She was breast fed. She walked after nine months and talked after one year. At the age of three and a half she fell twenty feet on to a flower pot and sustained a fracture of her skull. Immediately after the accident she is reported to have shown signs of 'tetanus'. She was taken at once to the Prince of Wales' hospital, Calcutta, and admitted. On admission she was unconscious. She is reported to have vomited twice. No bleeding was observed from either the nose, mouth or ears. No skiagram was taken as she was very restless. She was given anti-tetanic serum and discharged after one week as 'cured'. From that time on the patient has suffered from repeated attacks involving disturbances in her speech accompanied by a partial loss of consciousness. As there are no other disturbances than these, there is always a great likelihood of an attack passing unnoticed should it come on when the patient did not happen at the time to be speaking. If, however, she was in the act of speaking when the attack came on, she would break off in the middle of a sentence and repeat the last word uttered several times over or begin to whistle. It appears that no attempt was ever made to keep an accurate register of the number of attacks she would have in one day. All that her mother can say is that sometimes she would have 'very many' while at others only 'a few'. No day passed without at least one attack. At the age of 13 she was trephined and some pieces of bone removed. No improvement followed this operation; the attacks continued exactly as before. The patient says she knows when an attack is coming but she cannot describe the aura. When an attack has passed off she has no recollection of it having occurred. She cannot evoke an attack by will. Beyond being somewhat tall for her age and rather 'weedy', there is nothing else wrong with the patient. She is backward for her age in regard to scholastic attainments since she was taken away from school at an early age on account of her illness. As is so often the case with patients suffering from epilepsy, she has been prevented from acquiring the ordinary accomplishments of a girl of her type. She cannot ride a bicycle nor swim nor play any outdoor games. For this reason her physique has suffered and she feels inferior to other girls of her own age and standing. Many of the usual drugs have been prescribed from time to time but without any success in relieving the symptoms. It would appear that a real amelioration can only follow treatment on surgical lines.

Muskens, in his book to which allusion has already been made, cites a case very similar to the one under consideration. His patient fell from the third story of a house on to a clothes prop when she was 3 years of age. As a result of this fall she sustained an injury to her skull which left a depression on the left side of the calvarium over the parietal region. She was immediately operated on. After the operation she began to have unilateral epileptic fits. When 13 years old she was operated on again with temporary improvement. Some years later she underwent a fourth operation but no improvement followed. At the age of 22 another operation was recommended as the fits had become bilateral. The operation was not performed as it was feared that the fits, which

had become very numerous, would get worse. A year later she was operated on for the fifth time and a deformed piece of bone, that had been left over in the former operations, was removed. No improvement followed. After six weeks she was operated on for the sixth time. This time the dura mater was freely exposed and a macerated opening was found in it. Just inside the opening two small splinters of vitreous lamina were discovered lying on the cerebral cortex. They were removed. No improvement followed. Finally the patient underwent yet another operation in which the brain was exposed as before and a weak faradic stimulation was applied with a bipolar electrode to that part of the cortex. It was found that epileptic fits could be induced by stimulation of certain definite areas of the cortex. These areas were carefully removed with a spoon to a depth of 4 millimetres and the wound closed. The patient has remained free from fits for seventeen years. She has married and has given birth to healthy children and suffers from no mental incapacity whatsoever.

This history is very instructive both from the surgical and the neurological aspect. Among other points, it emphasizes the importance of the use of the faradic current for diagnosis. No doubt much experience is required before the method can be used with success. I have little doubt that could a surgeon be found who possesses the necessary experience and could my patient be persuaded to undergo another operation, she might very easily obtain permanent relief from her symptoms. It should however be borne in mind that in traumatic epilepsy a cranial operation is only part of the treatment for the operation merely removes one of the conditions which facilitate the development of chronic epilepsy. Several factors may play a part and among other things great care must be taken that digestive disturbances do not arise and that constipation is avoided. If found necessary, drugs may be administered but only under supervision. Personal cleanliness down to the smallest detail of the care of the teeth or artificial dentures, careful supervision of the diet, total abstention from alcohol, rest, open air, regulated exercises as well as definite psychical encouragement, are all prophylactic measures of serious import. Lastly, it is important to remember that the prognosis of *petit mal* is not so good as in the case of severe fits. The explanation of this may lie in the hypothesis, assuming it to be correct, that *petit mal* attacks are not sufficient to dissipate the toxins, the accumulation of which induces the fit. Cases that suffer, on the other hand, from severe fits often describe a feeling of unusual well-being after a fit for the accumulated toxins have been thoroughly dissipated by the fit. Further support of this contention is derived from experiments carried out on cats through the administration of camphor and other drugs.

Considerations of this sort, however, should in no way preclude surgical treatment in definite cases of epilepsy due to cerebral trauma, no matter what may be the nature of the fits.

-A CASE OF HYDROPHOBIA WITH THE LONGEST INCUBATION PERIOD ON RECORD

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A. K. B., MALE CHILD, aged 10½ years, son of Mr. A. K. M., Bangalore, was brought to the institute at 11-45 a.m. on 15th June, 1935, from Bangalore.

History of the case.—On 20th March, 1932, at 7 a.m. the boy was bitten by a street dog which entered into the house, inflicted the wounds on him and ran away; further whereabouts of the animal not known. Other persons or animals bitten by the dog not known.

The parents and the patient are quite certain (on repeated questioning) that there was no subsequent bite by dogs, cats, mongooses or any other suspected rabid animals. Infection from drinking unboiled milk was excluded. The parents are well educated and belong to a highly respectable family.

For some months after this incident, it is said that the boy was very much afraid of dogs; later, he used to play with two dogs reared by one of his relatives and these dogs are reported to be alive and quite healthy.

The boy was bitten on the right side of the chest through clothing and was scratched on the dorsum of left hand on the bare skin. A small scar on the right anterior axillary margin and a scar 1½ inches long running down from the right nipple were visible. These two scars were said to have been due to the bite of the dog. (The parents and the patient, on repeated questioning, definitely say that there were two wounds on the chest while on the history card of this patient, it is written that there was only one wound on the chest.) No scars are visible on the left hand, but it is mentioned in the history card that there were two wounds on the left hand.

On the history card it is mentioned that the wounds were not cauterized, but the father of the patient now says that he took the boy immediately after the bite to a medical practitioner who cauterized the wounds within half an hour of the injury, but the actual agent used for cauterization is not known to him.

The boy underwent a full course of antirabic treatment then in vogue (1 per cent carbolic sheep vaccine, 5 c.cm. daily for 14 days, irrespective of the age of patients and classification of wounds) at the Bangalore Cantonment treatment centre, from 22nd March to 5th April, 1932. He took the 14 injections in 15 days, having been absent for one day during the course. After six months, the boy was reported to be alive and healthy.

Present complaint.—On 11th June, 1935, the boy complained of pain in both the scars on the right chest, the sites of the original bites in 1932. The pain gradually increased and was felt in the whole of right arm and right chest.

On the night of the 12th June, he had a few spasms of the muscles of the neck.

On 13th June, spasms of the neck muscles gradually increased in severity and frequency. In the evening, he complained of difficulty in swallowing water and this condition gradually got worse.

On 14th June, the patient was taken from Bangalore by train to Coonoor, and he arrived at the institute at 11-45 a.m. on 15th June.

Condition on admission.—The boy was very much excited. He shouted and screamed at the sight of

strangers (the staff of the institute) and also at any sudden noise. The characteristic stare was apparent. He was very restless and talkative, tossing about and jumping out of the bed. Spasms of the neck muscles occurred frequently. Severe spasms of throat muscles at the sight of water in a tumbler was observed. Even at the mere mention of 'water' (when the patient's mother asked for some to drink) these spasms occurred. The patient complained of thirst, but dared not attempt to drink water, due to the spasms. Unable to take food. Moderate salivation present. Bowels moved on 14th June evening. Urine passed freely on arrival at the institute. Pulse rapid, 110 per minute. Owing to the restless and excited condition of the patient, the temperature could not be taken, but the body felt warm to the touch.

15th June, 1935.

12-15 p.m. Morphine sulphate ½ grain hypodermically.

2-15 p.m. Still in the same excited and restless condition. ½ grain morphia repeated.

5-30 p.m. Still restless and tossing about and jumping up in the bed. Spasms of the muscles, almost of the entire body, occurred very frequently, accompanied by screaming. Incoherent and noisy, talks as in delirium. Profuse salivation present. Took two small sips of coffee with great difficulty. Pulse rapid, 130 per minute. Morphia ½ grain repeated. Glycerine boracic was applied to the lips.

7 p.m. The patient was quiet, and in an exhausted condition. Pulse very feeble.

8 p.m. The patient expired.

Diagnosis.—Hydrophobia.

Date of bite.—20th March, 1932.

Date of first symptoms of illness.—11th June, 1935.

Incubation period.—3 years, 2 months and 21 days (1,176 days).

Days of illness.—4 (96 hours).

Date of death.—15th June, 1935.

Period from date of bite to death.—3 years, 2 months and 25 days (1,180 days).

Comments.—The incubation period is the longest on record. Some have noted very long incubation periods in exceptional cases after protective inoculation—1½ to 2½ years—after excluding all possibilities of new infection in the interval. The only possible explanation that can be offered is that the virus was lying dormant after antirabic treatment, until it was roused to activity by some cause. Fortunately, such cases are exceptional.

TREATMENT OF NEURITIS WITH VACCINEURIN

By J. N. ROY, M.B.

and

H. K. SAHA, M.B.

(From the Carmichael Medical College, Calcutta)

THE patient M. D., Hindu female aged 40 years, was admitted into the hospital with the following complaints:—

Palpitation—2 months' duration.

Burning sensation all over the body—1 month's duration.

Pricking pain in hands and legs—1 month's duration.
Inability to walk—1 month's duration.

Mucus diarrhoea, passing 6 to 8 motions in a day—15 days' duration.

History of onset.—The patient says that about one month previously, after an attack of malaria which lasted a few days, she felt an intense pain on the right side of her chest while eating. Later it developed into a burning sensation spreading all over the body. After a few days' treatment it diminished, but pain and burning sensation over the ankle, small joints of lower extremities, wrist and hands persisted. The pain used to suddenly become severe and very frequently she had cramps in her muscles.

Personal history.—Mother of two children. No history of abortion, periods—regular. Admits history of syphilis and gonorrhoea and was treated for syphilis five years previously.

Family history.—Nothing particular.

Past history.—A few years previously she suffered from oedema of legs with pain in the limbs.

General survey.—An adult female of short stature and thin musculature with hands and legs atrophied.

Pulse—96 per minute; volume—moderate; tension—low and regular; respiration—20 per minute and the temperature—98.4°F.

Examination of nervous system.—Higher functions and cranial nerves—normal.

Sensory functions.—Hyperæsthesia and hyperalgesia all over the body particularly over the lower limbs (beginning from the ankles and wrists respectively and extending upwards), the deep-seated tenderness was much exaggerated, especially in the calves. Other types of sensation were not affected.

Motor functions.—Paresis of muscles in upper and lower limbs more marked in the latter (this also began from the ankles and wrists respectively and extended upwards). Slight atrophy of muscles in the affected region; the extensors were more affected than the flexors. There was inability to raise the legs, and the muscles were flaccid. No abnormal muscular movement was observed.

Reflexes.—Superficial—abdominal—present.

	plantar—flexor response.
Deep—	ankle—absent.
	knee—diminished.
	adductor—present.
	triceps—present.
	biceps—present.
	supinator—absent.
Clonus—	ankle and patellar—absent.

Organic reflexes.—normal.

Vasomotor and trophic.—redness and pitting on pressure in the distal portion of lower limbs.

Skin.—glossy, no eruptions present.

Digestive system.—liver palpable, 2 inches below costal margin.

Abdomen.—hard, not tender.

spleen just palpable, moderately hard.

Other systems.—nothing of importance.

Laboratory findings.—Blood examination. Hæmoglobin—70 per cent, red blood cells—3,440,000, white blood cells—7,500, polymorphonuclears—70 per cent, lymphocytes—24 per cent, monocytes—2 per cent and eosinophils—4 per cent. Wassermann reaction—negative and Kahn—doubtful.

Stools.—normal and contained no ova or protozoa.

Urine examination report.—Normal except for a few pus cells and numerous epithelial cells.

Treatment and progress of the case.—Just after admission, the patient was given an antisyphilitic mixture. On the third day after admission injection of vaccineurin series 1 was begun, one ampoule every alternate day, strictly following the directions given by the makers. The patient began to improve after the completion of series 1 and the next two series of injections were given, the patient improving all the time.

The patient was kept in hospital for 42 days; on the twenty-second day of her stay, she had a sharp rise of temperature and quinine was administered. The temperature came down, but again she had a similar rise of temperature on the twenty-fifth and twenty-seventh days, after which she remained afebrile and kept good health.

At the end of series 2, she began to walk a little and could walk freely at the end of series 3 of the course. When she was discharged from hospital, she was relieved of her pain and hyperæsthesia almost completely and her general appearance had become nearly normal, from a condition which at first appeared to be hopeless and incurable.

Remarks.—This is the second case of peripheral neuritis in which we have been able to complete the full course of vaccineurin injections, and get such encouraging results.

We have used this drug in sciatica and trigeminal neuralgia with remarkable results, and we are trying it on other nervous cases.

Disadvantages of treatment.—The treatment is tiresome, as there are three series of injections of six ampoules each, i.e., eighteen injections, and the number of days actually required for completion of the whole course is 35 days.

The price is high. Finally these patients are neurotic and find difficulty in waiting for the full course of treatment with patience.

A CASE OF REVEALED ACCIDENTAL HÆMORRHAGE

By R. G. VANCHESWARA IYER, L.M.P.

Civil Hospital, Thongwa

M. S. M., a Burmese female, aged 38, an eighth para in the eighth month of her pregnancy, suddenly started discharging blood at about 2-30 a.m. on the morning of 6th April, 1935. She had gone to bed the previous evening in a perfectly good state of health, and woke up suddenly at about 2-30 a.m. with a desire to micturate. On standing up blood commenced to flow from the vagina and getting alarmed about her condition she sent for the Municipal Results System Midwife. The midwife finding the condition beyond her sent for me. I saw the patient for the first time at 3 a.m. on the 6th April, 1935. She was lying on a bamboo mat on the floor of her house and blood was escaping from her vagina leaking through the floor and gathering on the ground underneath. She must have lost about one pint of blood by this time. I made a vaginal examination and found that the os admitted two fingers. No difficulty was experienced in excluding placenta prævia as no placenta was felt either centrally or marginally through the os. The presenting part was not fixed in the pelvic brim and I felt certain that the head was not presenting. I diagnosed the condition as revealed accidental hæmorrhage and had the patient removed to the hospital in a cradle. Despite the loss of blood the patient's general condition was not as yet serious. The pulse was only 64 per minute. I decided to plug the vagina and being short of cotton-wool sterilized strips of gauze, rolled into balls of convenient size, were used to plug the vagina tightly, starting from the posterior fornix. The woman complained of pain when the plugs were rammed well round the cervix. A 'T' bandage was applied and the patient put to bed. I gave her a hypodermic injection of morphine sulphate $\frac{1}{2}$ grain and atropine sulphate $\frac{1}{75}$ th grain and ordered a mixture containing calcium chloride grs. 10 to be given every hour for the next

six hours. It was 4 a.m. when I completed the plugging and hypodermic injection. Notwithstanding the morphine injection the patient did not sleep. At 7 a.m. her pulse rate was 100 per minute. There was no complaint of abdominal pain or discomfort. At 11 a.m. the patient again discharged blood although the vaginal plugs were in position. There was no pain and the uterus was not contracting. She was placed on the operating table and the plugs removed. She was bleeding profusely, and the os was dilated to admit three fingers. I ruptured the membranes and with my fingers in the uterus managed to draw down one leg and by traction succeeded in delivering a living female child. I divided the cord between two pressure-forceps, kneaded the uterus and with external manual pressure expressed the placenta. The woman had lost a large quantity of blood by now and was in a state of collapse. I gave her 1 c.cm. of pituitrin hypodermically and three vints of saline intravenously. At 3 p.m. the patient had a temperature of 101°F. and her pulse rate was 112 per minute. She complained of thirst. There was no post-partum hæmorrhage, her temperature was normal next morning and continued so throughout her stay in the hospital. Her puerperium was uneventful except that the baby died on the second day after delivery. She walked out of the hospital cured on 11th April, 1935, six days after delivery.

A CASE OF SARCOMA OF THE THIGH

By A. C. DEY, L.M.R.

Senior Resident Medical Officer, Astanga Ayurveda Hospital, Calcutta

T. S. Hindu, male, cultivator by occupation, aged 20 years, an inhabitant of the district of Midnapur, was admitted by the writer in the Astanga Ayurveda Hospital on the 2nd August, 1933, for a tumour on the left thigh.

Previous history.—About a year ago he had a fall and injured the lower third of his left thigh. A few days later he noticed a swelling on the injured part. It was painful to pressure and he had applied liniments



Fig. 1.—Before operation

and embrocations without effect. The swelling gradually increased and attained such a huge size that he was compelled to remain in bed. The patient said that he used to get febrile attacks off and on with occasional pain on the site of the tumour. The huge size of the tumour and his incapacity to do his normal

duties compelled him to come down to Calcutta for treatment.

Condition on admission.—The patient was in a very low condition. Pulse—120, and respiration—26 per minute. Temperature—100°F. The heart—apex beat was at the sixth interspace; first and second sounds were feeble. The lungs—a few scattered râles and rhonchi were present in both lungs. The liver—not palpable. The spleen was enlarged 2 inches below the costal arch.

The tumour.—It involved practically the whole of the left thigh extending from the greater trochanter to the knee joint. The length of the tumour was 21 inches and the greatest circumference 27.5 inches



Fig. 2.—After operation

The superficial chain of lymphatic glands of the left groin was enlarged.

Blood examination.—Hæmoglobin—50 per cent, red blood cells—2,700,000 per cubic millimetre and white blood cell—12,100 per cubic millimetre.

Differential count.—Polymorphonuclears—56 per cent, lymphocytes—23 per cent, large mononuclears—17 per cent, and eosinophils—4 per cent.

Considering the above circumstances, the surgeons hesitated as to whether he would stand an operation. On account of the serious condition of the patient and his repeated requests for removal of the tumour, operation was decided upon and disarticulation of the hip joint was done by Dr. S. C. Das under spinal (spino-caine) anaesthesia on 7th August, 1933.

On examination of the tumour after the operation it was found to be a mixed-celled sarcoma containing

round, oval and spindle cells and involving the soft structures of the thigh.

The patient made an uneventful recovery except for a few post-operative complications and was discharged cured on the 27th September, 1933. As far as information could be obtained by the writer the patient is still alive and is in good health.

Points of interest in this case are :—

1. Huge size.
2. Absence of metastases.
3. The patient is still alive, though the operation was done a year and a half ago.

In conclusion I am grateful to my visiting surgeon Dr. D. P. Ghosh, for permission to publish the notes of this case.

A CLINICAL CASE OF PULMONARY TUBERCULOSIS

(COMPLETE RECOVERY FOLLOWING PNEUMOTHORAX TREATMENT EVEN IN A CASE WITH CAVITATION)

By N. R. NADIG, L.C.P.S. (Bom.)
Hubli, Dharwar District

The patient, a male of thirty-six, had extensive tuberculous infiltration in the left lung; x-ray examination suggested the presence of two large cavities in the upper and middle part of the left lung, and also slight tuberculous infiltration of the apex of the right lung which appeared to show a tendency towards fibrosis.

The hilar shadows were enlarged on both sides suggesting the presence of calcified tuberculous glands. The heart and aorta were normal.

On admission the patient had all the usual constitutional symptoms, *viz.*, temperature, cough, expectoration, and night sweats.

I decided to induce artificial pneumothorax in his left pleural cavity with the idea of compressing the two large cavities, after giving him complete rest in bed for a fortnight.

The patient came to me on 1st October, 1934, and was given the primary air injection of 350 c.c.m. on the 15th. The pleural cavity showed a well-marked negative pressure. A refill of 400 c.c.m. was given on the 18th October.

On screening the patient on the same day the picture showed a fairly good collapse of the lung, which appeared like a flattened band, against the hilum. The cavities were also partially compressed.

The refills were given once a week at this stage.

The patient gradually showed alleviation of his symptoms—he had slight expectoration and fever, and he increased about twenty pounds in weight in two months.

In December the patient started walking a little and at present he walks about two miles a day without the least difficulty and without showing any constitutional symptoms.

He is now taking his refills at an interval of a fortnight and has resumed his duties of the management of his factory.

Conclusion.—My reason for describing this case is to show that pneumothorax treatment may be employed not only in early unilateral cases but also in advanced third-stage cases. No doubt there is every possibility of encountering extensive pleural adhesions at this stage, nevertheless it is advisable to try pneumothorax on such a case, and if found unsuccessful to give it up and advise some other treatment such

as thoracoplasty operation, with a view to compressing the cavities.

The immediate and remote effects of artificial pneumothorax

The immediate results that we usually see after inducing pneumothorax are often striking. In about a fortnight's time, the patient passes from a state of more-or-less profound illness into one of comparatively good health. The temperature subsides, the cough and sputum diminish, the patient regains his appetite, increases in weight, and his general health improves rapidly.

The more remote results of pneumothorax however have to be considered. These are of course much better when the treatment is given at an early stage of the disease, when the patient has good resisting power than when the disease is of long standing and the resistance has been markedly lowered.

It must be admitted however that many patients at an advanced stage can be relieved of their most distressing and obstinate symptoms and survive longer than would otherwise have been possible.

All medical men with experience of collapse therapy have had good, mediocre and bad results. They have also witnessed complete cures and these cures have been maintained for years after discontinuing the treatment.

There is a reasonable chance that artificial pneumothorax will check the activity of the disease, render the patient more comfortable, and prolong his life.

No doubt this is a therapeutic method which is capable of further improvement as knowledge advances. The indications and contra-indications should be laid down very precisely. The duration of treatment should be better understood than it is at present.

In my small experience, I have treated a sufficient number of cases, to say that the best results of artificial pneumothorax are of course obtained at an early stage of the disease of the lung, when the pleura is free from adhesions there is a sound opposite lung and a patient who is still in a fair state of general health and not totally exhausted. Even under apparently hopeless conditions the results have proved that collapse therapy is worth while.

The method is applied in the early cases in order to bring about a cure and to prevent the disease from spreading. I know of a few cases where the disease, which was unilateral, extended rapidly to the contralateral lung, in spite of open air, rest and nutritious food when efficient treatment by this method (artificial pneumothorax) might have checked the spread of the condition.

The treatment is carried out in advanced cases rather to save life than to effect a cure.

In this case an attempt at artificial pneumothorax was decided upon, only when it became

obvious that if left alone the patient would die. He is now in fairly good health and able to get about, although not fit for any strenuous work.

Conclusion

The creation of artificial pneumothorax should be used as a palliative measure in advanced cases. By this means it is possible to render the patient's life more comfortable. A complete collapse of the lung should not be attempted.

At an advanced stage with both lungs affected the worse is selected for artificial pneumothorax. Air should be injected very slowly at repeated intervals, as there is every chance of the contralateral lung being overworked on account of the extra strain put on it.

Finally it must be emphasized that artificial pneumothorax cures an early case, and it should not be considered only as a last resource. Considerable benefit is derived when extensive disease is found in both the lungs. There is everything to gain and nothing to lose and this procedure should be adopted as long as there is any hope of improvement.

AN UNUSUAL SITE FOR A HYDATID CYST

By JEMADAR MANOHAR LAL DANG, D.T.M., I.M.D.

Indian Military Hospital, Quetta

ALTHOUGH hydatid cysts may be found in any tissue of the body, the liver and lungs are by far the commonest sites.

Case history.—A Sikh carpenter, aged 23 years, first asked advice on account of a swelling the size of an almond on the left side of the neck below the angle of the jaw. The swelling had been gradually increasing in size for about eighteen months. Superficially the appearance was that of an enlarged lymph gland. There were no other enlarged glands, and on closer examination the swelling was found to extend fairly deeply, it was fairly mobile and felt cystic in consistency.

On x-ray examination there was a spherical semi-translucent tumour just below the left mandibular arch not adherent to any structures in the vicinity.

Operation.—An incision 2 inches in length was made along the anterior border of the sterno-mastoid muscle from the angle of jaw on the left side. The swelling was revealed under the platysma and deep cervical fascia lying on the submaxillary gland and adherent to it. It was the size of a hen's egg and had a pearly-white capsule. It was dissected off the submaxillary gland and was adherent to the carotid sheath. A piece of the sheath was removed along with the cyst. The wound was closed and it healed by first intention. On opening the cyst it was found to contain several daughter cysts and was a typical hydatid in appearance.

Microscopic examination of the fluid revealed a number of hooklets.

I am very grateful to Captain H. A. Ledgard, I.M.S., for conducting the operation and supplying me with notes of it and to Major D. W. M. MacKenzie, R.A.M.C., for allowing me the radiographic examination.

A CASE OF DYSENTERY CAUSED BY *BALANTIDIUM COLI*

By LAL MOHAN BANIK, L.M.T.

Assistant Medical Officer, Teok Tea Estate, Assam

A WOMAN, aged 60 years, was admitted into hospital complaining of abdominal discomfort and passage of loose stools containing blood and mucus.

The stool on naked-eye examination was semi-formed, clay-coloured and contained blood and mucus.

Under the low power of the microscope a number (about 50 per field) of oval-shaped mobile bodies could be seen in the stool preparation. Some exhibited constant rotatory movement while others in addition showed actual locomotion. A few were seen dashing in and out of the field. Under the high power the protozoa showed cilia all round, the 'mouth' at one end (also ciliated) and the two big vacuoles with numerous smaller vacuoles in the cytoplasm characteristic of *Balantidium coli*. No cyst formation was seen. One parasite attracted attention by its dumb-bell appearance. The constriction in the middle gradually grew greater and greater till division into two daughter protozoa was complete. The protozoa were found to live for about two and a half hours under the cover glass and would probably have lived longer if drying had not taken place.

As the labourers on the estate keep pigs it is highly probable that the infection originated from them.

Treatment.—Magnesium sulphate by mouth and emetine gr. $\frac{1}{2}$ daily for six days failed to have any effect. Thymol gr. 16 was also found to be useless. Finally three Yatren enemas were given (eight ounces of a 2.5 per cent solution), once on each of three consecutive days; these cleared the stools of protozoa and the patient of symptoms.

A CASE OF INFANTILE SCURVY

By D. N. CHAKRAVARTI, M.B.

Malda

A FEMALE CHILD, aged nine months, was brought to me for the following complaints:

- (i) Symmetrical swelling of both the lower extremities for about a month.
- (ii) Inability to move both the legs for the same period.
- (iii) Screaming when the parts were touched.

On examination the child looked quite healthy but was extremely apprehensive of the legs being handled. The legs were immobile, slightly flexed at the knees and the thighs were rotated outwards. The lower epiphyses of both the femurs were much enlarged and tender. One of the lower incisors was being cut and was almost through but there was neither swelling nor change of colour of the gum. There was no tendency to hæmorrhages from any part of the body nor abnormality in any other systems. There were no signs of rickets.

On inquiry into the history I learnt that the child had been fed entirely on boiled cow's milk and barley water from the 8th day of its life and mother's milk for the first seven days only. No patent food was given. The parents denied any history of syphilis.

From the history of its feeding and frequency of scurvy at this age, I diagnosed the case as one of infantile scurvy.

The child was put on orange juice two ounces a day, and baked potatoes. The potatoes were baked in the skin and the mealy parts just beneath the skin were scraped and shaken up in milk, which the child was then given. In eight days there was marked improvement.

As the family were too poor to afford orange juice I prescribed mango juice afterwards, one teaspoonful four times a day, which eventually cured the child completely.

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OCTOBER

CINCHONA POLICY

We do not feel that any excuse is needed for raising again a subject that has become a perennial one in these columns, namely, the cinchona policy in India. If any excuse were needed, it is provided in the fact that since our last editorial reference to the subject the results of certain investigations that have a direct bearing on this very important subject have been published.

The most important of these publications was the report of the Malaria Commission of the Health Organization of the League of Nations on the therapeutic efficacy of totaquina, which was issued about a year ago. Some of our readers will perhaps remember that in our April issue last year we expressed great disappointment that the sub-committee whom the Commission had charged with the work of appraising the efficacy of various antimalarial drugs had failed to take advantage of a very excellent opportunity to test the comparative antimalarial potency of totaquina, under the controlled conditions that the malarial treatment of general paralytics has provided, in the mental hospitals where this form of therapy is used. This more recent report of the Health Committee deals with the results of trials with the two varieties of totaquina, on the lines suggested by the sub-committee and with supplies of totaquina provided by them, in a number of malarious countries. The following quotation from the introductory paragraphs of this report summarizes the aims of the committee's investigations and in particular their object in introducing totaquina:—

'There was no suggestion of replacing quinine by totaquina. It was intended, however, that the use of mixtures of alkaloids should enable treatment to be extended to the masses These mixtures are, in fact, less expensive than quinine, for they are obtained either by adjusting the residual products of quinine manufacture to the standard specification by the addition of quinine, or by the extraction of all the alkaloids from the bark of the least expensive species of cinchona, such as *C. robusta* and *C. succirubra*. It is a well-known fact that the rationalization of quinine production has led to the selection of that species of cinchona whose bark has the highest quinine content—*C. ledgeriana*, a very delicate species which only flourishes in areas

satisfying certain special conditions as regards altitude, soil, temperature and moisture. The circumstance that only *C. ledgeriana* is at present employed for the manufacture of quinine gives the producing countries a practical monopoly and thereby influences the prices of quinine.

'The two other species—*C. robusta* and *C. succirubra*—which are much less delicate, can be grown in most tropical countries, for which reason their bark is cheaper. Whilst they contain less quinine, their total alkaloid content may be higher even than that of *C. ledgeriana*. Finally, the manufacture of totaquina with such barks is much more economical than the process of quinine extraction, seeing that the various alkaloids are not separated'.

The results of the trials in different countries have been analysed critically by Dr. William Fletcher and his analysis forms the most important part of the report. As was to be expected there was a considerable degree of disparity in the results obtained, not only in relation to the different samples used but according to the places in which the trials were carried out, so that the analysis presented some difficulties. From the point of view of the analyser the most satisfactory trials were carried out at Kuala Lumpur, because parasite-counting methods were employed and at the same time a control series of patients was treated with quinine; the Nanking series must have been one of the least satisfactory, as in this series for some unexplained reason a very large percentage of the patients vomited and therefore probably absorbed smaller and varying quantities of the drug. Although Lieut.-Col. J. A. Sinton's name appears amongst those to whom samples were sent, no report appears to have been received from India in sufficient time to be included in this analysis.

The final opinion of Dr. Fletcher is summarized in the following two paragraphs:—

'To sum up, the records of the cases treated at the different centres show clearly that totaquina acts like quinine as a potent remedy in all forms of malaria; but it must be remembered that a field trial of this kind is not a carefully controlled experiment and, when it comes to deciding whether totaquina is a little better than quinine or not quite so good, one is on less sure ground and, in the absence of adequate controls treated with quinine, the yard-stick needed for more exact measurements is lacking. Similarly, the observations made at the different centres were not sufficiently precise and unanimous to warrant a final decision on the relative merits of the different samples of totaquina.

'As regards toxicity, the case records contain no cogent evidence that totaquina is more toxic than quinine in the doses given, but it is not easily soluble and should not be given in a fluid mixture'.

Similarly the findings of the Health Committee after examining this report were:—

'That totaquina seems able to fulfil the purpose for which it was intended, since, having regard to its efficacy—equal to or only slightly less than that of quinine—, facility of preparation, and cost price, its use would enable malaria treatment to be extended over a wider field'.

Use under normal conditions in a malarious country must be the final test for appraising the value of any antimalarial drug and we therefore fully appreciate the importance of this report. Nevertheless it has had the effect of accentuating our regret, already expressed, that the 'carefully controlled experiments' to decide 'whether totaquina is a little better than quinine or not quite so good', to which this field trial would have formed a most excellent corollary, were in fact never carried out.

The second of the publications to which reference was made above appeared in the March number of the *Records of the Malaria Survey of India*; in this paper the results of a trial with the two types of totaquina and with quinine are reported by Dr. Hicks and Sub-Assistant Surgeon Subedar Diwan Chand, both of the Malaria Survey of India. The trial was carried out on the lines suggested by the Health Committee and the report is a model of what a report of this kind should be. (Elsewhere in this number we have given an extensive extract from this paper.) This trial includes a small untreated series; the fact that the mean duration of fever was not 'significantly' less in this series than in the treated series need shake no one's faith in the efficacy of the cinchona alkaloids, as the series was a small one and certain circumstances made the statistical evaluation of the figures difficult. Judged according to four different criteria of efficacy, namely, the rate at which they banish the parasites from the peripheral blood and the rate of control of the fever, each in benign and malignant tertian malaria, quinine scores one point, totaquina type I one point, and totaquina type II two points. If 'significance' is taken into consideration, and of course it must be, only one point is scored and that is by totaquina type II. There were more than 250 patients included in this trial, and if the 'untreated' control group is excluded, there was an average of 40 patients in each group and no group contained less than 31, so that in point of numbers it may be considered an important series. The results provide unequivocal proof that neither type of totaquina is in any way inferior to quinine in the treatment of either benign or malignant tertian malaria.

The third of these important publications is of interest for a slightly different reason; it is a paper entitled 'Philippine Totaquina', by Drs. Maranon, Perez, and Paul F. Russell, which appeared in the March (1935) number of

the *Philippine Journal of Science* (only received by us in mid-August). By the co-operation of various state departments, Dr. Russell and his co-workers have on a small scale carried out an examination of the problem of the treatment of malaria in the Philippines, from the economic, the botanical, the chemical, and the medical points of view, in the way that for years we have urged in these columns that this same problem as it applies in India should be examined on a scale commensurate with the size of the country and the importance of the problem. The state of affairs in the two countries have many points of similarity; e.g., the real requirements in cinchona alkaloids are at least ten times the actual consumption at the present time; quinine is retailed at an exorbitant price, far beyond that which the peasant sufferer can afford to pay; even the wholesale price is far too high to allow any extensive treatment campaign to be carried out by the government; finally, it is believed by the writers of this paper that a cheap efficient drug could be produced in the country itself which would enable this disparity between the amount of antimalarial drug needed and the amount actually used to be reduced very considerably, just as we believe that if a definite policy were adopted in India this country could be made independent of outside supplies within a very few years. Here the similarity between the cases in the two countries ends, for the idea of planting cinchona in the Philippines only seems to have been conceived within the last decade, whereas the first attempts were made in India almost a hundred years ago, practically synchronously with those in Java which country now holds a virtual world monopoly of quinine.

Though these first attempts were not successful, it is now more than 75 years since cinchona bark was grown in this country on a commercial scale, and to quote from Dr. Russell's paper, 'by 1866 there were more than 1,500,000 plants growing in the Nilgiri Hills, in south-west India, and this number had nearly doubled by 1872'. In the Philippines the first successful attempt was made in 1927, and yet in the treatment experiments reported in this paper the totaquina was prepared from bark produced in the Philippine plantations, where there are already about forty thousand trees growing. The cost of the locally-prepared totaquina has been worked out very carefully and has been found to be only two-fifths of the wholesale price of imported quinine; it is pointed out that if it were prepared on a larger scale a considerable reduction in the cost of production could be effected.

On the clinical trials reported in this paper no great emphasis need be laid; they have shown, just as all other trials have shown, that, given in the doses in which quinine is usually given, totaquina is an efficient anti-malarial drug. The final conclusions at which

these writers arrive are, we think, worth quoting in full :—

'It is not improbable that if every case of malaria occurring in one year in the Philippines could be given a 250-grain treatment there would be needed—at least 30,000 kilograms more specific febrifuge than is now imported.

A 250-grain treatment with quinine sulphate in the provinces costs from 2.50 to 5 pesos (1.25 to 2.50 dollars United States currency). The greater the need, the higher the price. Quinine dihydrochloride retails for from two to four times as much as the sulphate. These retail prices are far more than the average farmer in the provinces can pay. Quinine and the synthetic drugs plasmochin and atabrine may therefore be called a rich man's remedies. There is no probability that much more quinine can be paid for than is now imported.

The Bureau of Forestry has demonstrated that cinchona will grow in the Philippines and will give as good a yield of alkaloids as that grown elsewhere.

From our studies we conclude that the standardized total-alkaloid-extract of cinchona, recommended by the Health Organization of the League of Nations and called 'totaquina', can be prepared locally from Philippine cinchona easily and inexpensively.

We conclude from some clinical tests that this Philippine totaquina is probably about equal to quinine sulphate in its therapeutic value against malaria.

We conclude that, allowing a fair profit to the grower of cinchona, the manufacturer of totaquina, and to the retailer, this Philippine totaquina could be sold to the people at not more than 35 centavos (0.175 dollar) per 250-grain treatment.

Contrasting 35 centavos with the present retail price of from 2.50 to 5 pesos for a 250-grain treatment with quinine sulphate or atabrine, we conclude that the local production of totaquina would materially aid in combating malaria in the Philippines.

We also conclude that the growing of cinchona and the manufacture of totaquina might have considerable economic importance to the Islands, being capable of becoming sizeable new industries'.

This is the position in the Philippines seven years after the cultivation of cinchona was first taken up; one wonders whether these islands will achieve their independence from foreign supplies before we in India with our seventy years' start do. We are afraid we know the answer.

India has never lacked champions of the total-alkaloids cause, but opposition on the one side and lethargy on the other have always proved too strong for them. Only recently, Colonel Chopra, in his drugs enquiry report, presented a strong case for the adoption of some definite cinchona policy, but so far no action has been taken; active opposition is certainly declining, but the lethargy still remains.

The fact that the alkaloids of cinchona other than quinine are of value in the treatment of malaria has been appreciated in this country for the full seventy years since the birth of the local cinchona industry and probably nowhere in the world have alkaloidal mixtures been used so extensively, and yet no policy constructive enough even to lead to the standardization of these alkaloidal mixtures has ever been adopted, and a state of affairs has been allowed to come about where in some provinces the reputation of cinchona febrifuge has sunk to the level of that

of its poorest representative, the hard insoluble cake, consisting of the residual alkaloids, mainly amorphous, and containing scarcely a trace of quinine, that has from time to time found its way into government dispensaries.

Now the League Health Committee have stepped in and suggested a standard, and it seems to us that it would save a great deal of confusion if this standard could be universally adopted. But of course this is not sufficient reason for adopting it unless at the same time it is found to be a satisfactory standard from our (Indian) point of view; on the other hand we should not adopt the attitude that it was not our standard, that we are not going to be dictated to by a lot of foreigners, and that therefore we won't have anything to do with it!

The standards laid down for totaquina must be considered on their merits. As far as we know, no reasonable objection to these standards has been raised. One criticism was that totaquina is a little more expensive to produce *under present conditions* than the unstandardized cinchona febrifuge that is being produced in the Indian factories; we have no doubt that this is the case (just as it would cost the Rolls-Royce Company more to make a Ford car in their factory than it would to make a Rolls-Royce), but we are not interested so much in the cost under present conditions as under conditions that could be brought about by a change of policy in the cinchona plantations and factories in India. The only important point is, can totaquina be made from the total alkaloids of the hardy species of cinchona, *C. succirubra* or the hybrid, *C. robusta*, without subjecting the alkaloidal mixtures to the expensive processes of separation and reblending? From the information available on the alkaloid content of these barks, we gather that it can, but of course this is a point on which an authoritative opinion from the officers in charge of the plantations and factories is necessary.

It is a matter of considerable interest to study the source of and reasons for the opposition to totaquina. In the first place there is serious opposition from the quinine monopolists. From this quarter, together with much praise for quinine and criticism of its rivals, one hears, successively, that the hoards of residual alkaloids (from which type II totaquina can be prepared) are non-existent, that in any case they will be soon exhausted, and finally that quinine manufacturers will be only too pleased to dispose of them, and would encourage their sale if they felt that it was for the benefit of suffering humanity. One must remember that, even if they gained a slight temporary advantage by selling their waste products, the movement for the introduction of totaquina is definitely against the interests of the Dutch monopolists, as their monopoly is dependent on the fact that Java has the most suitable climate

in the world for the production of *C. ledgeriana*, the species which gives the highest yield of quinine, and that, if the demand is for total alkaloids, countries where the hardier species grow well will be able to compete on an equal footing. Opposition from this quarter may therefore be expected, and should be discounted.

Quinine appears to possess an almost uncanny hold on its adherents; to some medical men, otherwise reasonable enough, any suggestion that there may be something as good as, if not better than, the pure alkaloid quinine is sacrilege and arouses within them a vicarious religious fervour. Though one may explain to them that in this instance no attempt is being made to displace quinine and that raising the status of the other members of the cinchona family can only reflect more glory on its most important member, they are still suspicious.

There is the opposition of the passive-resistant type. The representatives of this type know full well the therapeutic value of the mixed alkaloids, and that by introducing them into all government dispensaries much larger supplies of antimalarial drugs could be purchased, and consequently a much larger number of patients treated, with the expenditure of the same money, but they excuse their inaction by cryptic remarks about 'wider issues being involved' and 'the dangers of medical men attempting to interfere in matters beyond their scope'. They also point out that the problem of distribution to the masses is a much more serious one and ought to be tackled first. But surely it is all part and parcel of the same problem; the high price of quinine is the greatest obstacle to its wide distribution to the people, whichever way you look at it; it limits the amount that governments can afford to buy, it encourages dishonesty in dispensers and other distributors, and it complicates the free distribution as the recipients realize that quinine is a valuable saleable article.

Then there are the students of the laws of supply and demand who take the view that as the demand for the mixed alkaloids increases either their price will rise to the present price of quinine, or quinine's will drop to such a low figure that the working of the new suggested plantations will become unprofitable. The first eventuality might conceivably come about, though even in these circumstances it seems improbable, if we increased the consumption of total alkaloid mixtures without changing the plantation policy, but the whole point of our argument is that this policy *should* be changed and the hardier cinchona species planted over a wide area, and in these circumstances we should soon be independent of the world price of totaquina; the second, namely, that our policy in this country will benefit the whole malaria-suffering world by bringing down the price of quinine to a fraction of its present price, is surely too good to hope for; were such

a thing possible (but we see no reason to suppose that it is, as there are many areas in India eminently suited to the growth of high-total-alkaloid-yielding cinchona plants and it should be possible to produce totaquina at a very low cost) then it would be the duty—and not an unpleasant duty as it would be a profitable one—of the government to protect their own industry by imposing an import duty on cinchona alkaloids and other antimalarial drugs.

Finally, there are those who take up the attitude that the present cinchona febrifuge, made in the government cinchona factories, is good enough. They may well be right, but no body of medical men is going to recommend the extensive adoption of a drug of unspecified and varying composition for the treatment of a serious disease like malaria. Sir John Megaw, the late Director-General, Indian Medical Service, though he fully appreciated the necessity for a cheap antimalarial drug, always hesitated to advocate cinchona febrifuge, solely, we believe, for this reason.

Surely the ideal is a high one, the inauguration of a policy that will eventually place an efficient form of treatment within the reach of the whole of the malaria-stricken masses in India. We do not imagine that this can be achieved in one year, or two, or even ten, but unless some definite progressive policy (*e.g.*, one in which all the local purchasing governments agree to replace quinine by totaquina in their hospitals, dispensaries, and rural antimalarial schemes, and at the same time the producing ones agree to extend their plantations of the hardier varieties of cinchona) is adopted it will never come about at all. It will certainly never come about if we are to remain dependent for our supplies of antimalarial drugs from foreign countries, and to allow ourselves to be exploited by foreign monopolists.

Apparently, there are few places in India where the high-quinine-producing cinchona species will grow, therefore there would be serious difficulties in producing sufficient quinine for the country's real requirements, but it would be possible by extending the present plantations to produce in a few years' time enough totaquina to treat India's estimated 100,000,000 sufferers from malaria. (At present only one-tenth of these are treated and two-thirds of our cinchona supplies come from outside the country.) Admittedly, the distribution presents very considerable difficulties but this problem is being tackled in a number of provinces, and here, as we have already said, the high value, as well as the high price, of quinine is a serious obstacle; the difficulties of distribution will gradually be overcome, then the problem of shortage of supplies will become acute unless some policy is adopted in the meanwhile.

We are repeatedly reminded by our opponents of the passive-resistant class that 'wider

issues are involved' and that there is also an agricultural and an economic side to be considered. This we fully realize, but these experts are not going to start their considerations unless we give them the lead.

When writing on this subject before we complained that the medical profession were not in

a position to give a definite answer to the question, 'Is totaquina as good, or nearly as good, as quinine, for the oral treatment of the ordinary attack of malaria?' We are now in a position to say quite definitely that for all practical purposes totaquina is quite as good as quinine. What is to be the next step?

Special Article

THE DYSPEPSIAS OF SOUTHERN INDIA*

By IAN M. ORR, M.D., F.R.C.S. (Edin.)

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Of all the conditions which we as medical men are called on to deal with, nothing is more common than dyspepsia in one of its manifold forms. Few diseases are so resistant to treatment, so persistent in their symptoms, and cause so much chronic invalidism as do the dyspepsias. When dyspeptics come to our consulting rooms and outpatient departments we at once look for signs of duodenal ulcer and, failing to find definite evidence of that, we prescribe an alkaline mixture, which nearly always gives some measure of temporary comfort to the sufferer, but leaves the disease unlocated, undiagnosed, and untreated.

I do not wish to dwell at length on the familiar subject of duodenal and gastric ulcer, except in so far as the pathology is peculiar in south India. Nor do I wish to deal with the cause of acute abdominal pain, but rather I would call your attention to the interesting and varied list of conditions that give rise to symptoms somewhat similar, characterized mainly by pain, indigestion and flatulence, and whose pathology nevertheless is so varied.

Stomach

'All is not gold that glitters' and all who have hunger pain, vomiting, and epigastric tenderness, are not necessarily suffering from gastric or duodenal ulcer.

Chronic gastritis.—This is the first and most common condition to which I would draw your attention.

Pathology.—The lining of the stomach becomes coated with mucus which blocks the mouth of the secreting glands. The deeper layer becomes infiltrated with round cells and in an extreme degree the cells of the glands undergo cloudy swelling and may atrophy.

The rugæ of the stomach become larger, firmer and more tortuous; this may be demonstrated by x-ray, by giving a small meal of barium and water only, and pressing the walls of the stomach together, so that the barium just

fills the pockets between the rugæ. The body of the stomach as a whole may be affected and thus the acid-secreting glands which are situated mainly in the body are seriously interfered with, with a resulting fall in free hydrochloric acid, or only the pyloric portion of the stomach may be affected and the hydrochloric acid in the stomach remain normal or high, i.e., we have a hypoaacid gastritis and an acid gastritis.

Ætiology.—This will be discussed more fully below, but it may be said here that the taking of over-spiced and indigestible food, and irregular habits about meals all tend to exaggerate it. Oral sepsis no doubt plays a part. The exhibition of certain drugs for long periods also predisposes towards it; e.g., sodium salicylate, quinine, arsenic, silver, mercury and copaiba. An atrophic form may be found in association with malignant disease; in fact it may be said that malignant disease of the stomach is always associated with atrophic gastritis and malignant disease of other organs, such as the colon, breast, etc., and they usually give rise to it by the absorption of toxins from the disintegrating tumour.

Symptoms.—Discomfort and sensation of fullness which may amount to pain about one hour after food. Appetite is diminished, and there is nausea, a bad taste in the mouth, dizziness, regurgitation and flatulence. This is due to the lack of acid allowing decomposition and carbon dioxide formation. Hydrochloric acid is diminished and mucus is found in excess in the fasting juice. If the pyloric portion of the stomach is alone affected the hydrochloric acid may be high.

Treatment.—Remove all bad teeth, septic tonsils, and deal with sinus infection if any. Lavage with hydrogen peroxide, an ounce to the pint of water, serves to remove the mucus and allows the gastric juice to be secreted freely. This may be repeated daily for a week or until the mucus disappears. If there is hypoaacid, give hydrochloric acid in water with meals. A general tonic containing iron, arsenic and strychnine may be given, but if not well tolerated by the stomach it may be injected in ampoule form.

Diet.—Avoid hot curries, spices, raw fruit, shell fish. Take milk, barley water, congee water, wheat, junket, chicken soup, Horlick's

*Paper read to the Travancore and Tinnevely Medical Association on 10th March, 1935.

milk; later, go on to toasted bread and butter, boiled eggs, white fish, rice.

Mention may be made of atrophic gastritis in contradistinction to the above hypertrophic type. This is chiefly associated with the more severe anæmias and chronic venous congestion. In certain inborn errors also, hydrochloric acid may be absent. The most useful method of determining whether or not an absence of free hydrochloric acid is merely due to mucus blocking the ducts or to an inborn error is to inject 0.5 c.cm. of histamine*, and immediately hydrochloric acid will be poured out in simple gastritis.

Nervous disorders of the stomach.—The nervous system and, particularly, the mental states of fear, worry, excitement, nervous exhaustion, etc., have a marked influence over the stomach. We have all experienced the pre-examination feeling of not wanting a big meal, because of a complete failure of our stomach to secrete its daily quota of free hydrochloric acid. Or the feeling of heaviness in the pit of our stomach when we are disappointed, ill at ease, or distressed. Now let us examine these nervous upsets of the stomach.

(a) *Hyperchlorhydria.*—A point in physiology is important to understand. Stimulation of the vagus causes constriction of the sphincters and outflow of gastric juice. This stimulation of the vagus may be reflexed from gall stones or appendix. There is a lymphatic path from the appendix to the duodenum and it has been demonstrated that chronic inflammation of the appendix causes a spasm of the pylorus and an increase in free hydrochloric acid, a condition favourable to the formation of gastric ulcer.

A state of chronic nerve strain, such as is common to men dealing in big business, is associated with hyperchlorhydria. Excessive indulgence in pickles, spices and smoking have a similar effect. My experience is that the normal acidity curve for the people of south India is higher than for Europeans because of the excessive stimulation of the mucosa by hot curry stuffs.

Symptoms.—These are sensation of fullness and discomfort in the epigastrium and belching. There may be epigastric tenderness. The test meal reveals high acidity and yet the x-ray shows no positive evidence of ulcer.

Treatment consists in avoiding the anxiety state if possible. Avoid carbohydrates, especially rice, and take boiled meat, milk, albumin water, fish and green vegetables. Oily substances have the effect of reducing the outflow of gastric juice and relaxing the sphincter. Hence olive oil, butter and cream should be taken.

*The usual dose of histamine is 0.0005 gramme, so that the author is presumably referring to a solution containing 1 mgm to the cubic centimetre.—EDITOR, I. M. G.

A mixture containing magnesium and bismuth to neutralize the acidity and belladonna to inhibit secretion and relax the sphincter is indicated. Sodium bicarbonate is not deserving of the popularity it enjoys, for, though it does neutralize the acid at first, it then irritates the gastric mucous membrane, causing more acid, and the formation of carbon dioxide and belching.

(b) *Gastro-succorrhœa* (i.e., excessive secretion but not a hyperacid one).

It is common in students at examination times, in girls at puberty, etc. It is characterized by nausea, belching and vomiting of large quantities, for no particular reason. In bad cases the patient may be cold with a slow pulse and sometimes headache due to stimulation of the vagus.

This condition has to be differentiated from:—

- acute gastritis—vomited material alkaline;
- migraine—headache worse and vomitus bilious;
- alcoholic gastritis—occurs in early morning after drinking, bout and vomitus is mainly mucus.

Treatment.—Gastric lavage 1-2,000 silver nitrate to promote mucus formation. Belladonna should be given internally.

(c) *Hypochlorhydria.*—This is found in people suffering from nervous breakdown or extreme nervous exhaustion; also in states of fear. It may be an inborn error, or it may be associated with one of the severe anæmias.

Symptoms.—Loss of appetite, sense of fullness, distaste for meat and there may be diarrhœa, the desire to go to stool occurring immediately after taking food; this is a reflex action and is a common cause of chronic diarrhœa.

Treatment.—Give a diet rich in carbohydrate and condiments, and poor in protein, the reverse of the hyperchlorhydria diet. Give an acid mixture with *nux vomica* and *pepsin*.

(d) *Gastric hyperæsthesia.*—This is found in neurotic people who complain of unusual sensations in the region of the epigastrium and belching, and describe their symptoms with a wealth of detail which is apt to weary the physician. There is usually a completely normal test meal and x-ray, but still the patient complains of pain and tenderness and many other things, and may vomit without relief. This is a pure neurosis and must be treated by removing the patient from the environment of sympathetic friends. Sea bathing, interesting occupation, toning the body by open-air exercise, massage of the abdomen, and rubbing with spirit or camphor. Such a patient will not be satisfied without medicine, and a general tonic containing dilute phosphoric acid, tincture of *nux vomica* and peppermint water will convince him that he is being treated.

One might mention here that belching which is a symptom common to almost all gastric disorders is in most cases due to simple air swallowing and not to

the formation of gas in the stomach. The patient is unaware that he swallows air, and a useful method of getting him to realize the fact and to repress it by an act of will is to tie a string round his neck above the thyroid cartilage and each time he swallows he will notice it and check it. In simple stenosis, however, there is fermentation by yeast in acid medium giving rise to carbon dioxide. In chronic venous congestion also, the vessels of the stomach wall fail to absorb gas which accumulates and is eventually eructated.

Muscular disorders

Gastric atony and dilatation.—*Ætiology.*—

(1) General muscular weakness and enervating surroundings.

(2) Overloading of the stomach, either by living too well, or, in the case of the very poor, by ingesting large quantities of food of poor quality in order to obtain sufficient nourishment.

(3) Sedentary habits.

(4) Auto-intoxication from chronic sepsis.

Symptoms.—These resemble gastritis and hypochlorhydria and indeed may be associated with one or other of these conditions. There is discomfort, feeling of fullness, flatulence, the appetite is good but quickly satisfied. Later on, the tongue becomes broad and flabby, the pulse slow, hands clammy, and there is headache and insomnia. Hydrochloric acid persists for much longer than normal, and organic acids are formed in excess. X-ray reveals a large stomach, no peristalsis, and, while the duodenal cap does not fill of itself, food can be squeezed into it by palpation. There is no tenderness specially related to the duodenum, and no deformity of the duodenal cap, hence duodenal ulcer can be excluded. Also the lack of peristalsis makes an organic stenosis unlikely. The test meal will exclude gastric succorrhœa.

Treatment.—Give dry diet; avoid fat, as it delays emptying and decomposes into fatty acids; avoid bulky diet, like rice, which will increase the condition. Where the patient's means permit, give white fish, chicken, cereals, toasted bread with jam or honey. Stimulants to the gastric muscle, such as nux vomica, quinine and eserine salicylate, are indicated and a general tonic of iron, arsenic and strychnine by injection if not tolerated by the mouth. Gastric lavage 3 hours after meals, to prevent the retention of decomposing foodstuff, is valuable and, unless there is gastritis, magnesium carbonate is as good a substance as any.

Gastric and duodenal ulcer.—This is one of the commonest diseases of this part of India and because of its frequency and the ease with which it responds to surgical treatment we are rather apt to treat it lightly and pass all our dyspepsias over to the surgeon. It is not a common condition, however, in other parts of India. McCarrison reports that in south India 1.765 in every thousand of the population suffer from duodenal or gastric ulceration, while in Lahore, which is typical of north India, only 0.030 per thousand are found to suffer in this

way. That is, in south India it is nearly 60 times more frequent. If the figures of central and north Travancore were examined, they would be twice or thrice that of south India in general. What is the cause of this remarkable variation? The most suggestive possibility is the diet. A diet typical of north India contains large amounts of wheat, milk, mutton, root vegetables, cabbage, dāl and fruit. The balance of protein, carbohydrate and fat is correct and the vitamin elements are well represented in the milk, wheat and vegetables. Compare that with the diet of the poorer class Travancorean where the staple article is tapioca and rice, both almost entirely carbohydrate and almost totally devoid of vitamin substances. The very small amount of mutton, fish and eggs that they are able to get in no way make up the protein deficiency, and the vegetables readily available, such as brinjal, ladies' finger, cucumber, etc., are very deficient in vegetable protein and lack vitamin A. Coconut is rather better and contains a fair amount of fat, but only a small amount of vitamin A. Thus we are dealing with a population living on a high carbohydrate diet devoid of an adequate amount of vitamin elements, vitamins A and D being particularly short (Orr, 1933).

In the nutritional research laboratories at Coonoor an interesting experiment was carried out. Seventeen rats were fed on a typical Travancore diet and 17 were fed on a typical Madras diet which contains more rice and no tapioca. There was a control group fed on a well-balanced diet typical of the people of north India. The control rats remained healthy, the tapioca-fed rats had a 94 per cent mortality and the rice-fed rats an 82 per cent mortality. Forty-seven per cent of the tapioca-fed, and thirty-five per cent of the rice-fed rats were found to have lesions of the stomach. Those fed on tapioca diet were subject to congestion of the stomach and gastritis and both to epithelial overgrowths and ulceration. Those of the rice diet showed a lesion in the body of the stomach and those on the Travancore diet on the pyloric or 'mucous' portion (McCarrison, 1931 and 1931a). Monkeys were fed on a vitamin-deficient high carbohydrate diet and post mortems were found to show congestion and inflammatory changes in the mucous and submucous coats of the stomach, duodenum and lower ileum and colon, degenerative changes in the glands, loss of lymphoid elements, and invasion of the bowel wall by bacterial organisms. In three out of ten monkeys thus fed, gastric ulcer developed.

There appears to be little doubt then that a high-carbohydrate low-vitamin diet produces a gastritis or duodenitis and renders the mucosa liable to ulcer formation. As to the cause of the ulcer, authorities differ but the consensus of opinion seems to be in favour of the view held by Wilkie (1911) of Edinburgh, who has demonstrated that the first part of the duodenum is supplied by a small branch of the pyloric artery, the supra-duodenal artery. This is an end artery and any thrombus forming in its lumen (which might well result from the duodenitis) would produce a loss of vascularity of that part of the gut with necrosis and ulcer formation. Once the ulcer is formed, the gastric juice, which

is made more highly acid than normal by reason of the carbohydrate and the irritation of the condiments, will prevent it healing and lead to chronic duodenal ulcer.

The symptoms and treatment of duodenal ulcer are so familiar that I need not dwell upon them here except to point out one or two important facts.

(1) We have seen already that many things such as gastritis and hyperchlorhydria may cause pain, vomiting and epigastric tenderness.

(2) Hunger pain which is typical of duodenal ulcer may occur occasionally in cases of gall stones, appendicitis, dyspepsia, and excessive smoking.

(3) A feature of peptic ulcer which is not produced by other conditions is the marked periodicity. That is, in the early stages the pain is only present for a few days and then completely disappears for a long period only to return again. These periods of remission become shorter and shorter, and in the late stages when there is much associated gastritis the patient may say that he has no remission of symptoms. This periodicity corresponds to the healing and breaking down of duodenal ulcers.

(4) The vomiting typical of a peptic ulcer occurs at the height of the pain, it relieves the pain, and is highly acid in its reaction.

(5) The test meal and the x-ray are the final criteria by which we judge whether there is, or is not, a peptic ulcer and I would lay stress upon the use of the fluorescent screen and palpation in the diagnosis. To see the stomach on the screen and mark the point of tenderness, to witness the movements of the stomach and the way in which the duodenal cap fills is of the greatest importance.

Malignant disease of the stomach.—Here again a few words will suffice to call your attention to some important points. Moynihan (1909) propounded the view that 70 per cent of gastric ulcers became malignant and he consequently treated all gastric ulcers as potential cancer. Also he looked for previous ulcer symptom in the diagnosis of cancer. Modern surgical pathologists incline to the view that only 5 per cent of gastric ulcers become malignant and that much of the material Moynihan based his statistics upon were not cancerous ulcers at all, but merely advanced stages of simple ulcers. The point we must note however is that the majority of cancers of the stomach we see will have a short history. Any complaint of dyspepsia with loss of weight and appetite occurring in a man over forty who has never had anything wrong with his stomach before is very suspicious of malignant disease.

Cancer of the stomach will show the following :—

- (1) low or absence of free hydrochloric acid;
- (2) a trace of blood in every specimen of the test meal;

(3) distaste for meat; and

(4) a deformity of the antrum of the stomach in the x-ray.

Never wait to palpate a tumour before diagnosing cancer of the stomach. The signs and symptoms apart from the above are often indefinite and confusing, but it is far better to operate and find no cancer than to wait until secondaries have spread to the glands and liver.

There are certain other conditions that we must consider to make our review complete.

Gall stones and cholecystitis.—The special interest of this condition lies in the fact that it is so very uncommon in this part of the world. In Neyyoor we always examine the gallbladder in our abdominal operations, so that few if any gross pathological changes in this organ have not been seen and dealt with; yet in a series of 2,300 upper abdominal operations, only in 38 has gallbladder pathology been noted, a ratio much smaller than that found in western countries or even in central India. It is well recognized that the formation of gall stones depends on three factors:— (1) increased cholesterin in blood, (2) some impediment to the flow of bile, and (3) some chronic inflammation in the wall of the gallbladder.

Increase in cholesterin is found mainly in pregnancy, hence gallbladder disease is more common in women. It is said to be increased in typhoid fever. It is definitely increased in certain diets and may be reduced by a cholesterin-free diet.

Biliary stasis is probably more associated with people living sedentary lives, and, as the average Indian woman is more a domestic drudge than her European sister and wears clothes which are freer and do not compress the lower thorax, she probably suffers less from biliary stasis.

Infection of the gallbladder is said to occur in typhoid fever. Cushing (1898) found 30 per cent of these gallbladder cases had suffered from typhoid. Another observer, Chiari, found *Bact. typhosus* in the gallbladder of 19 out of 22 persons who had suffered from typhoid. Now surely in a land like this, where typhoid is extremely common, we would expect to find a higher ratio of gallbladder disease. I have no experimental evidence to give you and can only throw out a suggestion which perhaps someone may be able to substantiate or refute. Though the gallbladder mucosa is frequently infected by typhoid, the other two factors necessary for stone formation are absent, namely, (a) increased cholesterin, as the poorer people at any rate live on a cholesterin-free diet and (b) lack of biliary stasis due to the costume and activity of the poorer women. So it is an ill wind that blows nobody any good; the diet that brings us peptic ulcer and gastritis safeguards us from gall stones.

But they do occasionally occur, particularly in the better classes who can afford a richer diet, and it behoves us to be familiar with the symptoms and differential diagnosis.

Symptoms.—Periodicity is absent in contrast to ulcer. There may have been attacks but there is always a continuous discomfort between the attacks. There is usually a history of jaundice, but jaundice may not be present at the time of examination. The patient, usually a stout well-nourished individual, complains of pain in the right hypochondrium, a feeling of fullness relieved by belching, not relieved by lying down and made worse by taking fat or eggs. This is peculiar to gallbladder infection, just as distaste for meat is typical of malignancy and hypochlorhydria. The free hydrochloric acid is low and the total acidity low, which contrasts with peptic ulcer and hyperchlorhydria. Tenderness is most marked over the tip of the 9th costal cartilage and is more marked on taking a deep inspiration.

Only pigment stones and those on which calcium has been deposited are seen by the x-ray but an idea as to the function of the gallbladder can be obtained by cholecystography.

Diseases of the pancreas.—Reference will only be made to two conditions that give rise to chronic abdominal pain and indigestion.

Pancreatic calculi.—This is not common but we have met with three cases recently in Neyyoor. In one, the symptoms were typical and pronounced; they are detailed below.

The patient was a thin man, not like a gallbladder subject; he suffered from repeated attacks of acute colicky pain which radiated to the left and to the left shoulder. He was tender in the epigastrium and had a weak thin rapid pulse. There was no history of jaundice which ought to have given us the clue, for an attack of biliary colic without at least a trace of jaundice must be uncommon. Also the pain did not radiate to the back and right scapular region as is usual in biliary colic, but across the epigastrium and to the left.

One feature of pancreatic calculi which is of diagnostic value is that they contain large quantities of calcium carbonate and are therefore easily seen by the x-ray; they can be removed by operation.

Chronic pancreatitis.—This is of two varieties, interlobular and interacinar. They are apparently similar in aetiology but differ in the effects they cause. The first affects only the cells of external secretion, the interacinar on the other hand is a general fibrosis of the gland and affects the islets of Langerhans, giving rise to glycosuria.

Aetiology.—Infection plays the primary part; it may reach the gland by :—

(1) the pancreatic duct, and is more often associated with acute pancreatitis,

(2) the blood stream in intestinal stasis, and may follow typhoid, or

(3) the lymphatics; there is an intimate connection between the lymphatics of the duodenum and gallbladder, and the pancreas,

and it is undoubtedly by this route that the chronic pancreatitis we see commonly arises.

Symptoms.—It affects middle-aged men and women; there is often a previous history of typhoid. There is a general bodily wasting, indigestion and attacks related to food but which may last over one or two meals. The appetite is poor and vomiting gives no relief. There is tenderness in the epigastrium radiating to the left and into left shoulder.

Stools.—Large and bulky and more oily than normal. Microscopically they show an increase in fat, but they can be distinguished from the fatty stools of gall-stone obstruction in that there is a great increase in unsplit fats. The unsplit fats can be distinguished from the split fats by staining with Nile blue which shows the globules of unsplit fat as bright red spots in a deep blue field. Unaltered meat fibres will be seen also, but there will not be much change in carbohydrate metabolism.

Special tests depend on the power of the pancreatic secretion to digest gelatin. A drug such as iodoform is given in a gelatin-coated capsule. If the pancreatic secretions are working actively the capsule will be digested and iodine will appear in the saliva in four hours. In pancreatic disease however the gelatin-coated capsule will pass unaltered by the pancreatic ferments. The diastase reaction is a very uncertain test and only positive in extreme degrees. At operation the gland is often found to be enlarged and hard.

Treatment.—Depends firstly on dealing with any duodenal or biliary sepsis by surgical measures, but, if no lesion in either of these organs is found, justifying a cholecystectomy or gastro-enterostomy, the correct procedure is to drain the gallbladder. This acts by draining away a possible source of sepsis and also as the pancreatic and common bile duct, in the majority of people, open into the ampulla of Vater it is a means of draining the pancreatic duct (figure 1). I have carried out this in four cases recently with good results.

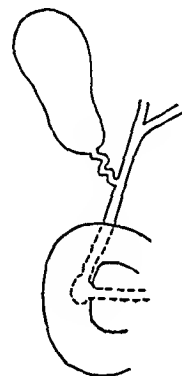


Fig. 1.—Showing the common bile duct and pancreatic duct opening into ampulla of Vater. Hence drainage of the gallbladder will also indirectly drain the pancreatic duct.

Appendix dyspepsia

This much-maligned organ carries far more than its share of responsibility for surgical intervention, largely because it is so easy to remove a healthy appendix and the mortality is practically nil, while the removal of a gall-bladder is a more formidable procedure. So many unfortunate patients have an innocent appendix skilfully removed and are left to suffer from chronic cholecystitis, salpingitis, or visceroptosis.

Nevertheless apart from acute appendicitis there is a condition known as chronic appendix dyspepsia, and owing to the lymphatic drainage of the appendix and its connection with the duodenum an unhealthy appendix may upset the gastric function to a considerable degree. A few points on the diagnosis of chronic appendix dyspepsia will therefore be in keeping here :—

(1) There will nearly always be a history of one, two or three acute attacks, rarely more.

(2) Each attack tends to be worse than the last and pain remains in the intervals.

(3) There is deep tenderness at McBurney's point.

(4) The acute attacks commence at the umbilicus and spread to the right iliac fossa, and are associated with pyrexia; this is an important distinction from visceroptosis, which we will consider next.

(5) The x-ray may reveal a kinked or fixed appendix, or barium may fail to fill it; all these suggest appendix trouble.

(6) On dilating the colon with air from an enema pump and pressing over the distended sigmoid, pain will be felt in the right iliac fossa in many cases of chronic appendicitis.

Visceroptosis.—This is the next cause of chronic abdominal pain to which I would direct you.

In my earlier years in India I dismissed this subject as one applying mainly to European women and not to be considered in dealing with the Indian dyspeptic, but my attention is being drawn more and more to it. I have repeatedly operated on a spare melancholic young woman suffering from the symptoms of duodenal ulcer only to find that there was no visible palpable ulcer, that the first part of the duodenum could be delivered outside the abdomen unusually easily, and that the cæcum was extremely mobile and had attached to it a very innocent looking appendix. I found that if one removed the appendix the patient was better for a time and then came back again or went to some other surgeon with the same symptoms.

Let us consider the four factors in visceroptosis and see if they throw any light on this type of case :—

(a) abnormal mobility and dilatation of the gastro-intestinal tract,

(b) the presence of accessory bands or membranes,

(c) changes in the body structure, and

(d) altered mentality.

All who have low viscera have not got symptoms and yet all who have symptoms of visceroptosis have low viscera.

The principal organs affected by (a) are :—

(1) the stomach whose greater curvature may droop into the pelvis and the lesser curvature be kinked and U-shaped;

(2) the duodenum which may be more mobile and which is sometimes crossed in its third part by the superior mesenteric artery which will be drawn more tense by the drag of the ptosed intestines and constrict the duodenum causing duodenal ileus (figure 2);

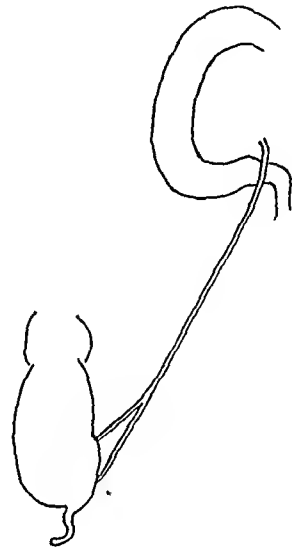


Fig. 2.—Showing ptosis of cæcum causing drag on superior mesenteric artery and kinking of duodenum.

(3) the cæcum may be in the pelvis or more mobile than normal and dilated or may be restricted by unusual bands. The colon also is more mobile and may be kinked at certain points by bands.

(b) The bands are definite in their situation and are known as Jackson's membrane, Lane's kink, Payr's membrane and Toldt's membrane (figure 3). I once came across a case where the transverse colon was kinked into a U, and the two limbs of the U held in apposition by a membrane (figure 3). I treated this case which was suffering from the symptoms of intestinal stasis by colectomy.

(c) The changes in body structure fall into two categories, virginal ptosis and maternal ptosis.

(1) *Virginal.*—The patient is a young woman, with tissues poorly developed, little fat, narrow thorax, loss of lumbar curve, and slightly protruding lower abdomen. These signs are present from childhood but only in adult life do symptoms appear.

(2) *Maternal.*—This occurs in elderly or middle-aged women who have borne children.

The abdomen is broad with wide thorax, loss of lumbar curve and a marked protrusion of the lower abdomen. The signs and symptoms do not appear till after several pregnancies and

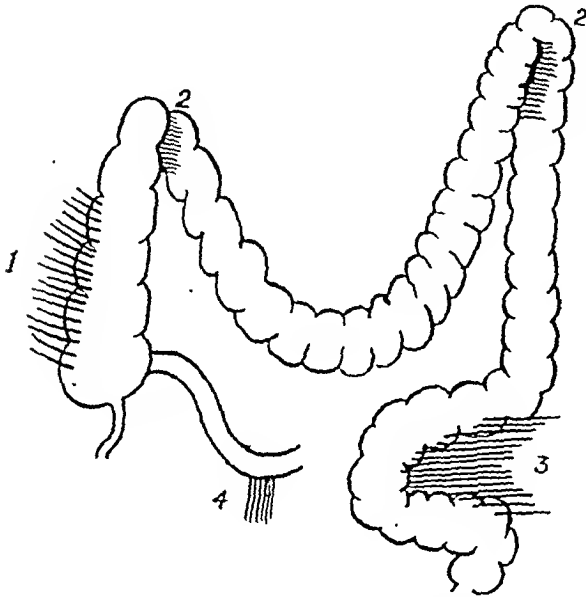


Fig. 3.—Showing the sites of bands and kinks.
(1) Jackson's membrane. (2) Payr's membrane.
(3) Toldt's membrane. (4) Lane's kink.

are due to loss of muscular tone often associated with loss of fat (figure 4).

—(d) *Changes in mentality.*—The patient is despondent, inclined to exaggerate her condition and can give off readily a long list of bodily ailments.

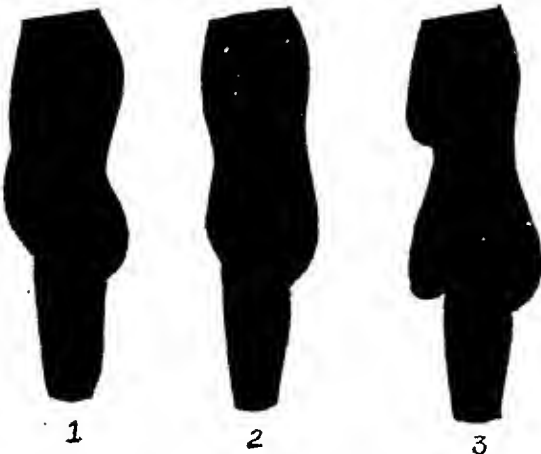


Fig. 4.—(1) Normal contour. (2) Virginal ptosis.
(3) Maternal ptosis.

Ætiology.—There are two functions of muscle, one is to produce movement and the other to maintain bodily posture. These two functions are evidently carried out by different parts of the muscle fibre and the postural tone may be lost without the power of movement being lost or diminished. This postural tone has to be

acquired in childhood by an act of will, till it becomes second nature to stand and sit correctly and the will plays no further part. In children of poor mentality brought up in unhygienic surroundings with little or no training, as are so many girls in this country, the will never acts strongly enough to maintain the correct posture and they go into adult life in the ptosis condition. In adult life with the increased strain put upon the body the ptosis becomes worse. Symptoms only appear, however, if there are present some of these congenital bands or membranes which kink the ptosed organ and eventually lead to intestinal stasis and toxic absorption.

The symptoms are very varied but are all characterized by the fact that no matter what the nature of the pain, it is worse at the end of the day and is relieved by lying down. The patient has a typical bodily structure and feeble mental outlook, and while the patient is usually a woman men are sometimes affected. The symptoms may simulate the following diseases:—

(1) *Chronic appendicitis*, but instead of two or three attacks there may be a history of numerous attacks, not getting worse as does appendix dyspepsia. Vomiting is repeated and not just at the commencement of the attacks. Pyrexia is absent and there is no hyperæsthesia over Poupart's ligament, but an area of hyperæsthesia to the right of the umbilicus. The cæcum is dilated, splashing can be elicited and there is frequently a ptosis of the right kidney. This picture was implanted on my mind by a young unmarried woman who had had her appendix removed by another surgeon and came complaining of the usual pain in the right iliac fossa. Suspecting some adhesions or pelvic trouble I operated again and removed a large fibroid from the uterus. She was better for a time and then came again complaining of pain which was made worse after walking about but did not trouble her when resting. Careful palpation revealed a mobile right kidney and the x-ray revealed a general ptosis of the cæcum. As she was well off I had a visceroptosis belt made for her which gave her great comfort and relief.

(2) *Peptic ulcer* may also be simulated, but there will be no periodicity and no freedom between attacks, and pain commencing after a meal has not completely disappeared before the next meal. The patient is relieved by lying down. There is loss of desire for food, but no real fear of taking food. X-ray is typical and there may be local spasm suggesting ulcer. I have operated on many of these cases expecting to find an ulcer and instead have been confronted only by a duodenum which was easy to deliver and a spasm of the pylorus which might easily deceive one into thinking an ulcer existed. More careful pre-operative x-ray examination can exclude ulcer and the general

build of the patient ought to be a guide. Duodenal ileus to which I have already referred can also be readily diagnosed by the x-ray by noting a fullness of the second and third parts of the duodenum.

Cholecystitis and cancer of the stomach may also be simulated, but x-ray and response to rest and lying down, and the typical figure must be our guide.

Treatment of visceroptosis.—We must remember in treating this disease that there is no short cut, no easily-performed operation which will relieve the condition for we are dealing with people who have faulty postural tone, faulty habits, membranes and bands, as well as ptosis or a poor mentality which makes them unable to co-operate.

As the trouble in the virginal type starts in childhood, more careful training in school and by parents would prevent a lot of it. Until girls are treated with greater frankness and given more freedom it is unlikely that the mental problems will be solved.

In the established disease we must deal first with the poor tone and faulty posture. The first thing is rest in bed and during that time the muscles should be developed by massage and gentle exercise of gradually increasing severity. Deep-breathing exercises to develop the thorax and restore the lumbar curve must be carried out. A diet calculated to increase the amount of fat must be given if the patient's

means permit, and regular bowel movement by means of liquid paraffin is desirable. When the patient's circumstances make prolonged rest impossible a properly fitting abdominal belt often gives relief, but massage and exercise must be carried out as well.

The surgical treatment is unsatisfactory, but a mobile cæcum may be fixed by a cæcoplexy operation, and a ptosed stomach can be hitched up by means of one of the various methods of shortening the mesentery. The bands causing kinking may be divided and duodenal ileus may be relieved by a gastro-enterostomy, or duodeno-jejunoscopy, but it must be remembered that such operations will not relieve a general visceroptosis nor will they of themselves bring relief unless combined with rest, massage and exercise as described already. If the patient is neurasthenic never operate; it only makes matters worse.

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Medical News

INTERNATIONAL CONGRESS ON HEPATIC INSUFFICIENCY

An international congress on hepatic insufficiency will take place at Vichy in 1937, under the presidency of Professor Loeper, member of the academy of medicine.

The congress will be divided into two sections: Medicine and Biology, and Medical and Surgical Hydrotherapy.

This scientific meeting is a sequel to the congress on biliary lithiasis in 1932, which was presided over by Professor Carnot.

INTERNATIONAL UNION AGAINST TUBERCULOSIS

The executive committee and the council of the International Union against Tuberculosis, whose secretary-general is Professor Fernand Bezancon, met in Paris, at the Headquarters of the Union, 66, Boulevard St. Michel, on the 10th and 11th July, 1935, under the chairmanship of Dr. Piestrzynski, Under-Secretary of State for Poland. Delegates from 20 countries attended this meeting. The administrative meeting of the council was devoted to the preparation of the programme of the conference of Lisbon which is due to take place on the 8th, 9th and 10th September, 1936. The agenda of this conference is now definitely settled and will include the three following subjects: 'Radiological aspects of the pulmonary hilum and their interpretation', opening report by Professor Lopo de Carvalho (Portugal); 'Primary tuberculous infection in the adolescent and the adult', opening report by

Dr. Olaf Scheel (Norway); 'The open case of tuberculosis in relation to family and domestic associates', opening report by Sir Henry Gauvain (Great Britain).

At the scientific meeting of the council Professor Lyle Cummins (Cardiff) occupied the chair. Professor Madsen, of Copenhagen, submitted a report on 'Tuberculin standardization and tuberculin tests'. Dr. Kendall Emerson, Managing Director of the National Tuberculosis Association, gave an account of the work of Dr. Long and his collaborators who claim to have isolated the active principle of tuberculin. In a discussion in which Professor Madsen, Professor Lyle Cummins, M. Boquet, Professor F. Bezancon, Professor Sergeant, Professor Debre, Dr. Lesne, Dr. Rist, Dr. Troisier, Dr. Saenz, etc., took part, the respective merits of Pirquet's cuti-reaction and Mantoux's intradermal test were compared. The majority of the French speakers expressed a preference for the former method while their colleagues from other countries spoke on behalf of Mantoux's test. They all agreed on the advisability of adopting a standard tuberculin and a uniform tuberculin test.

COURSE OF INSTRUCTION IN MALARIOLOGY UNDER THE AUSPICES OF THE EASTERN BUREAU OF THE LEAGUE OF NATIONS, SINGAPORE

The Health Committee of the League of Nations is arranging for a third course of instruction in malariology which will commence at the King Edward VII College of Medicine at Singapore on 27th April, 1936.

It will be preceded by a preliminary revision course lasting four days for candidates with a limited experience of the subject. The theoretical and laboratory studies will continue until the end of May, after which the candidates will proceed in groups to Malaya, to Java or to French Indo-China for a further period of practical field work extending over three weeks. The object of the course is to complete the training of medical practitioners who are engaged, or intend to be engaged, in the work of malaria control in their own countries. The courses will thus be of interest not only to governments and municipal authorities but also to all medical men practising in eastern countries, particularly those engaged in estate work.

The administrative duties will be carried out by the Eastern Bureau.

There will be three distinct stages to each course:

- (1) A preliminary revision course;
- (2) Theoretical and laboratory studies with practical demonstrations;
- (3) Practical field studies.

The preliminary revision course is designed for students who have a limited practical experience of malaria, and those who may wish to revise the principles of hæmatology, protozoology and entomology, and the clinical aspects of malaria. It was introduced to avoid the inclusion of the more elementary aspects of these subjects into the main course, which were not required by the more experienced students. The preliminary course occupies four days, beginning at 8-30 a.m. on Wednesday, 22nd April, 1936.

The theoretical and laboratory studies of the main course will commence at the King Edward VII College of Medicine at 8-30 a.m. on Monday, 27th April, 1936, and will be completed on the 30th May, 1936.

The practical field studies will commence at the beginning of June, and for this the candidates will be divided into groups, one of which will study in Malaya, one in French Indo-China, and probably another in

Java. They will last approximately 21 days, during which the student will have the opportunity of becoming familiar with the routine of a malarialogist and the actual application of anti-larval and other anti-malarial measures to field conditions.

The League of Nations is making available a limited number of partial fellowships to candidates who are nominated by their Governments, on condition that these Governments bear half the cost entailed by their nominees.

Conditions of admission:

The subscription for the theoretical and laboratory course will be 75 Straits dollars, and will be received by the Eastern Bureau of the League of Nations at Singapore.

Candidates not attending the preliminary course will be expected to possess a working knowledge of malaria and of the fundamental principles of the contributory subjects, such as hæmatology, protozoology and entomology.

Any further information desired will be supplied by the Director of the Eastern Bureau of the League of Nations, 336, River Valley Road, Singapore, to whom applications for admission to the course should be addressed. These should reach Singapore not later than the 29th February, 1936, and as only thirty candidates can be admitted, early application is desirable.

INDIAN MEDICAL COUNCIL

MAJOR-GENERAL SIR F. P. CONNOR, *Kt.*, D.S.O., F.R.C.S., D.T.M. & H. (Eng.), L.R.C.P. (Lond.), R.N.S., I.M.S., Surgeon-General, Madras, has been duly nominated by the Government of Madras under Clause (a) of subsection (i) of Section 3 of the Indian Medical Council Act, 1933 (XXVII of 1933), as a member of the Medical Council of India, *vice* Lieutenant-Colonel R. E. Wright, C.I.E., I.M.S., resigned.

Current Topics

The Relative Clinical Efficacy of Totaquina and Quinine

By E. P. HICKS, M.D., D.T.M. & H.

and

SUBEDAR DIWAN CHAND, I.M.D.

(From the *Records of the Malaria Survey of India*, Vol. V, No. 1, March 1935, p. 39)

TOTAQUINA is a mixture of cinchona alkaloids prepared according to the formula of the Malaria Commission of the League of Nations (1934). It must contain at least 70 per cent of crystallizable alkaloids and 15 per cent of the total weight must be quinine; not more than 20 per cent may be amorphous alkaloid. It has been introduced as the result of a search for a drug suitable for the treatment of the vast malarious populations of the world which are too poor to buy quinine. As such, it must approach quinine in efficiency and safety, while being considerably lower in cost.

The formula allows for the preparation of totaquina in two ways. Type I is prepared by the precipitation of all the alkaloids of cinchona bark; type II is obtained from the alkaloids left after the removal of quinine, by adding to the residue enough quinine to bring the final mixture up to standard. It is intended that type I shall be prepared from trees such as *Cinchona succirubra* and *robusta*, which can be grown with comparative ease in many parts of the world, and which give a satisfactory yield of total alkaloids. Type II

is suitable for production from *C. ledgeriana*. This species is richer in quinine, and therefore more profitable commercially, but has a more restricted area of growth. It is expected that totaquina will be cheaper than quinine because all the alkaloids of the bark are used, and because it can be prepared from trees which will grow in many countries, thus evading the present restriction.

The Malaria Commission of the League of Nations, in making arrangements for trials of totaquina in many parts of the world, laid down the experimental method which is considered desirable. We have endeavoured to adhere to these recommendations as closely as local conditions allowed, in order that our results might be comparable with those of workers in other countries.

Experimental method recommended by the Malaria Commission of the League of Nations

The drugs are to be judged by their immediate therapeutic efficacy when given to patients who are in hospital and whose blood contains parasites at the time of treatment.

(a) Give each drug in tablet form by the mouth under medical supervision; the dose for 70 kg. of body-weight to be of 0.6 gm. for benign tertian; and 1.2 gm. for malignant tertian or quartan.

(b) Treat only those who have asexual parasites circulating in the blood. Give one dose daily, and make a blood film at the same time.

(c) Give the drug and make blood films for five days.

(d) Record toxic symptoms.

(c) The criterion will be the time required for the disappearance of asexual forms. The blood examinations should be carried out by the same technique and the same observer throughout, by counting one hundred fields of a thin film (*frottis*).

(f) The experiment should be made on groups of fifty patients for each drug, without preliminary selection of the patients.

(g)

(h) It is desirable to state whether the case is a first attack, a relapse or a reinfection, and previous treatment should be recorded.

Type of population under observation

The patients described in this report were male prisoners at the Central Jail and the Borstal Institution of Lahore. At the Borstal Institution, only those patients are included who were sixteen years of age or older, so that their degree of immunity is approximately the same as that of the adults in the Central Jail. The average weight of prisoners was 121.5 pounds; 84.5 per cent of the weights fell between 100 and 139 pounds. Work at the Central Jail was carried on from 17th May to 5th December, and at the Borstal Institution from 6th June to 8th September, 1934.

These men have been exposed to both endemic and periodical epidemic malaria all their lives. It is unlikely that any of our patients was suffering from his first attack, but a distinction between relapses and reinfections could not be made.

The patients were seen by us as soon as they complained of fever to the Jail Medical Officer. Many of them asserted that they had already suffered from fever for several days before reporting to hospital; this may in part account for the rapid response of the infections to cinchona alkaloids. They received no prophylactic quinine, and every effort was made to ensure that they obtained no antimalarial drug before they were sent to us. We believe that if any of our patients did receive such drugs, it was a very rare occurrence. To confirm this, the urines of a number of new patients, who had not yet been given cinchona alkaloids by us, were tested by Tanret's reagent. The reaction for quinine was given only by one man, who was not diagnosed as a case of malaria. When the patients left our ward, however, the treatment was completed by a short course of quinine.

Technique

The blood of all men complaining of fever was examined by thick and thin films. When a diagnosis of malaria was made, the patient was given two grains of calomel, a second thick film of his blood was made, and the parasites were counted by the fowl-cell method. He was then given the appropriate specific drug in tablet form in the prescribed dosage. Quinine sulphate and totaquina, types I and II, were given to alternate cases of benign tertian, and similarly to alternate cases of malignant tertian malaria. The patient was examined clinically for signs of intercurrent disease. Temperatures were taken at about 8 a.m. and 5 p.m. A magnesium sulphate mixture was given every morning to all men under treatment, and calomel was repeated when necessary. No other drug was taken.

Every morning the parasites in the patient's blood were counted, and a dose of the specific drug was given shortly afterwards. One dose only was administered each day. This continued until the blood was free from parasites for at least two consecutive days, and there had occurred at least one day free from fever, which was not followed by a subsequent recurrence of fever.

In endeavouring to estimate the frequency of toxic symptoms we avoided leading questions, merely putting to each man the daily question, 'How do you feel?' and recording his answer.

The quinine and both types of totaquina were provided by the Madras Government Cinchona

Department. The composition, as given by them, is shown below:—

	TYPE I	TYPE II
	Per cent	Per cent
Quinine ..	32	19
Quinidine ..	1	4
Cinchonine ..	11	20
Cinchonidine ..	30	26
Amorphous alkaloid ..	15	19

The total crystallizable alkaloids in type I are 74 per cent of the mixture, and in type II are 69 per cent. This corresponds roughly to the amount of alkaloid in quinine sulphate, which is 73.5 per cent. The tablets were of moderate size, each containing 0.25 gm. of the alkaloids. A dose consisted of one or more whole tablets, together with one tablet which was cut down to a size estimated to complete the correct total dose. This method is rather rough, but on account of the size of the tablets and the small amount of alkaloid in each, we do not think that the error was serious.

It will be seen that the above methods are those proposed by the Malaria Commission of the League of Nations with three exceptions. Firstly, the parasites were counted by the fowl-cell method. Secondly, it was impossible to distinguish between first infections, relapses and reinfections, or to record previous occasions on which the patient had been treated for malaria. Thirdly, the treatment was stopped when the patient had been free from parasites for two days and from fever for at least one day.

Control experiment

All the men probably possessed a considerable degree of immunity to malaria, and recovered quickly under treatment with cinchona alkaloids. It appeared possible that they might have recovered nearly as quickly with simple rest in bed and without specific treatment, a state of affairs which would have vitiated any conclusions drawn from figures claiming to give the results of treatment. Accordingly ten benign tertian cases were taken as controls and were put on a course of a simple diaphoretic mixture without any specific drugs. These alternated with cases taking cinchona alkaloids. In one control case it was necessary to terminate the attack on the second day by giving quinine; this man is not included in the table of results. In another case, totaquina type I was given on the fifth day.

Absorption of quinine and totaquina

The tablets of all three drugs disintegrated easily. When a tablet was placed at the bottom of a test-tube of tap water, it broke up in a few minutes without being shaken.

Every dose of cinchona alkaloids was given personally by one of the authors, who afterwards examined the man's mouth with the aid of a tongue depressor to ensure that it had been swallowed. The men showed no dislike for the tablets.

The administration of calomel and magnesium sulphate was intended to bring the intestines of all patients into a suitable condition for the absorption of the alkaloids.

To confirm the absorption, the urines of a number of cases were tested with Tanret's reagent from one to three hours after the administration of the drug. In all cases they gave the reaction for cinchona alkaloids. In view of these facts it may be assumed that the results of treatment were not influenced by inequalities of absorption.

Results

[The results of treatment are shown in tables which we are not reproducing, but which we have summarized below. Ed., I. M. G.]

In a small control series in which no treatment was given for a period of 5 days to 9 patients with benign tertian infection, the fever in 8 patients subsided within

3 days, so that there was little difference between this series and those treated with cinchona as far as the fever was concerned but the rate of disappearance of the parasites was significantly different, in favour of the cinchona series.

		MEAN DAYS OF DURATION OF FEVER		MEAN DAYS OF PERSISTENCE OF PARASITES	
		B. T.	M. T.	B. T.	M. T.
Quinine	..	1.51	1.98	1.05	1.28
Totaquina I	..	1.67	1.90	1.20	1.27
" II	..	1.42	1.91	1.08	0.99

In the malignant tertian cases the period of disappearance of parasites is 'significantly' lower in the case of the totaquina series than in the others; otherwise there is no significant difference between any two series. The incidence of toxic symptoms is materially the same in all the series.

Discussion of results

The material for the experiment consisted of Indian males who were 16 years of age or older. It is unlikely that any were suffering from their first attacks of malaria, and perhaps many of the benign tertian cases were relapses. Probably all the patients had some degree of immunity, varying with the individual, but the number of cases recorded is large enough to suppress serious errors arising from the individual factor. This also applies to the question of a possible multiplicity of strains of parasite, of which some may have been more amenable to cinchona than others.

The dosage was that recommended by the Malaria Commission of the League of Nations (1934). It was small and calculated to display slight differences in efficacy better than larger doses would have done. Where two drugs differ slightly in their action and are given in massive doses, these slight differences are likely to be masked.

If the criterion of the relative efficacy of quinine and totaquina is taken as the mean time required for the disappearance of parasites and fever, it will be seen that, though on the whole the variations are in favour of totaquina type II, in most cases the differences between the drugs are small and are within the limits of error due to random sampling. According to conventional usage, differences have been considered as 'not significant' when P is greater than 0.05 or the difference of the means is less than twice the standard error of that difference. By this test, the only case which is significant is that in which malignant tertian parasites disappeared more quickly under treatment with totaquina type II than with quinine. Here P is slightly less than 0.05, and the difference is slightly more than twice its standard error. It is possible that totaquina type II is more lethal to *P. falciparum*; but on the other hand there is some evidence that chance distributed milder cases to this drug for, among the patients treated by it, fever was recorded in only 31 (61 per cent), while the figures for quinine are 44 (82 per cent) and for totaquina type I are 42 (79 per cent). It will be seen that totaquina type II was not superior in banishing fever from those malignant tertian cases which suffered from fever.

The contrary seems to have occurred in the results for benign tertian, where totaquina type I has been less successful than either of the other two drugs in destroying parasites. Here the figures for febrile cases are for quinine 41 (59 per cent), for totaquina type I are 48 (70 per cent) and for type II are 36 (50 per cent).

Our conclusion, therefore, is that, under the conditions of this experiment, there was no distinct difference in efficacy between quinine and the two types of

totaquina in clearing the blood of parasites and in subduing fever. As to the relapse rate, we have no data on which to form an opinion.

Discussion of toxic effects

The toxicity of the samples was not easy to estimate. The statements of prisoners about subjective symptoms are not always reliable, as they naturally find it easy to remember those which they hope will ensure a longer stay in hospital. It was noticeable that toxic symptoms occurred in epidemics. When one man complained of vertigo, others in the ward would remember that they had been similarly troubled. At another time the prevailing complaint was 'weakness'.

In view of the unreliability of the complaints on which the records are based, it would be unwise to place much weight on the small differences observed, or to conclude that our figures display any real difference in toxicity between the three drugs. Indeed, it would have been surprising if this small daily dosage had provoked clearly defined toxic symptoms. In this connection it may be noted that Fletcher (League of Nations, 1934), when reviewing the trials of totaquina conducted under the auspices of the League of Nations, concluded 'As regards toxicity, the case records contain no cogent evidence that totaquina is more toxic than quinine in the doses given'.

The above results are in agreement with those which have been obtained in trials in other countries, and have been published by the Health Organization of the League of Nations (1934). The practical application remains to be considered.

Optimum dosage

The experiments give some evidence of the optimum dosage for a population having a degree of immunity comparable to that of our patients. Among all our men, only one had urgent symptoms. This was a case of malignant tertian malaria, who became comatose within an hour of taking his first dose of totaquina type I. It cannot therefore be considered as showing insufficiency of drug or dosage. We suggest that a dose of 1.0 gm. or 15 grains once daily for three or four days would be suitable for the routine treatment of rural populations in the Punjab. This should be large enough to prevent the majority of deaths and to remove clinical symptoms, which is all that is demanded by such populations.

The position of totaquina as an antimalarial drug

A drug which is to be distributed to poor malarious populations must be efficient, safe and cheap. The evidence shows that both types of totaquina are efficient and safe, but the question of price is more difficult. It would be out of place to discuss it at length in this paper, but the following general considerations may be of interest.

The mixture of cinchona alkaloids known as cinchon febrifuge is cheap because it is a by-product of the manufacture of quinine. If totaquina type II is produced by adding quinine to a mixture of residual alkaloids, its price will be higher than that of cinchon febrifuge by the cost of the added quinine and the expenses of analysis. The latter might be a serious addition to the cost if spread over a comparatively small bulk of the drug. Thus, on a small scale, totaquina must be more expensive than cinchon febrifuge. But totaquina was devised as a drug suitable for distribution on a large scale. In this case it will no longer be a by-product, and its price must rise, unless the sale of quinine increases proportionately. It would be necessary to devote special plantations to its production; all the alkaloids of the bark would then be used, and the totaquina prepared would be type I. It would differ from a cinchona febrifuge produced on the same scale only by the necessary analysis, of which the cost should not be very important when spread over a large bulk of the drug. Thus, on a small scale totaquina would probably be considerably more expensive than cinchon febrifuge, while on a large scale it

the strong preparations being reserved for chronic lesions. General measures are helpful also, although it is very difficult to assess their true value. It is generally agreed that starch and fat, or the whole intake, should be restricted since the affected children often are overnourished with greasy skins. Alkaline mixtures have a clinical reputation in the treatment of seborrhoea.

Breath Odours from Alliaceous Substances: Cause and Remedy

By H. W. HAGGARD, M.D.

and

L. A. GREENBERG, Ph.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. CIV, 15th June, 1935, p. 2160)

OFFENSIVE odour of the breath is often a matter of considerable importance to those afflicted, and medical advice is occasionally sought. The fact that the odour may arise from pathologic conditions in the structures of the mouth and respiratory tract is well recognized. But in many cases no definite pathologic changes are found. Moreover, the odour may not be present continuously but only during temporary periods of disturbed health or during menstruation.

It has been suggested that in such cases the substances causing the odour are of systemic origin; that the air in the lungs is tainted by aeration from the blood, or in the mouth from secretion of the substances into the saliva; or, again, that the odour arises directly from the stomach. It is more probable, however, as the evidence to be here presented also indicates, that generally the source of the odour is not systemic but local in the mouth or respiratory tract. Determination of the source is essential to any therapy.

As a phase of the problem that is directly amenable to experimental study, we have investigated the source of the odour arising after eating onion or garlic.

It is well known that there exists among different individuals wide differences in the intensity and particularly in the persistence of the odour on the breath after eating onion or garlic. Usually the breath loses its odour within a few hours, but in occasional individuals even small amounts of onion or garlic inadvertently eaten in salads, soups or sauces taint the breath for several days. Moreover, in such cases the odour often loses its typical alliaceous character after some hours have passed and, although the breath is offensive, it is difficult to identify precisely the nature of the odour. As a rule in the past little relief could be given for this condition except by disguising the odour with the use of mouth washes containing aromatic oils.

The odour from onion and garlic is due to the essential oils contained in these vegetables. That of onion is mainly allyl-propyl disulphide, $C_6H_{11}S_2$; this oil appears in garlic in small amounts, but the main constituent of the distillate from garlic is diallyl disulphide, $C_6H_{10}S_2$. In addition to these main constituents there are both lighter and heavier fractions of sulphur-bearing oils of uncertain chemical composition but all possessing disagreeable odours.

The taint on the breath after eating onion or garlic is due to the presence of these essential oils or their decomposition products in the expired air. Considerable uncertainty has existed, however, as to the manner in which the oils are discharged into the expired air. Four theories have been advanced:

1. That the oils pass into the blood stream during digestion, are then aerated from the blood in the lungs, and so pass into the expired air. For certain volatile substances such as ether, alcohol and acetone this passage from the blood to the air in the lungs is well established. This theory is the one commonly accepted also to explain the source of the odour on the breath after eating onion or garlic; occasionally it is amplified by the addition of a hypothetic secretory activity of

the respiratory mucosa by which the oil is believed to be selected from the blood and passed into the air—presumably to account for the fact that the blood, following digestion of garlic, has not been observed to smell of the oil.

2. That the essential oil appears in the saliva by secretion from the blood passing through the salivary glands.

3. That the odour passes from the stomach by way of the œsophagus (other than during eructation) and enters the breath through this channel.

4. That possibly the odour arises in part from particles of onion or garlic retained about the teeth, the tonsils and the papillæ of the tongue. Considerable attention has been given to pathologic conditions in the structure of the mouth and pharynx as sources of odour on the breath, but no one has advanced the idea that after eating onion or garlic the odour arises solely from particles retained in this locality. We, however, do advance such a theory and moreover we here substantiate it with experimental demonstration. The localization of the source of the odour to the mouth structure opens up a possibility of a remedy. No known measure could control the passage of the oils from the blood or saliva to the expired air or prevent their passage from the stomach; it is possible, however, as we shall show, to rid the mouth of the alliaceous oils.

From previous work in this laboratory with chlorine in the destruction of organic odours, attention was turned to the possibilities of this substance in the form of chloramine. After garlic had been eaten the teeth were scrubbed, the tongue brushed and the mouth rinsed with a solution made by dissolving one 4.6 grain (0.3 gm.) chloramine [Paratoluene sodium sulphon-chloramide, Chloramina, U. S. P.] tablet in each 30 c.c. of water. Particular attention was paid to the tongue, for the papillæ at the base of this structure have long come under suspicion as a source of odour from retained food particles. No odour of garlic could be detected on the breath but there remained a slight odour from the chlorine products. The question of whether the garlic odour was actually destroyed or simply masked was determined by analysis of the expired air.

Experiments were carried out first as controls to determine whether the chlorine odour liberated iodine from the pentoxide. The expired air of a subject who had not eaten garlic was first passed over the pentoxide to confirm the absence of any organic vapours. Next the teeth and tongue were washed and the mouth rinsed with the chlorine solution. The expired air was again passed over the pentoxide. No iodine was liberated; the chlorine odour did not affect the pentoxide.

In each of three experiments, 1.5 gm. of garlic was chewed and swallowed and the amount of oil in the expired air followed for one and one-half hours. During this time the oil had risen to concentrations ranging from 0.0027 to 0.0036 mg. per litre and fallen to the plateau level of from 0.0008 to 0.0011 mg. The mouth was then treated with chloramine solution as described. Repeated analyses during the next three hours showed absence of oil in the expired air. The chlorine products had deodorized the garlic particles.

Two additional experiments were carried out in which, after garlic had been eaten, the teeth and tongue were brushed and the mouth rinsed with 30 per cent solution of alcohol in water. Control experiments demonstrated that the vapours of alcohol, after the mouth had been washed with this substance, persisted in the breath for only fifteen to twenty minutes. In some proprietary mouth washes recommended for the removal of onion odour the only possible deodorant is the alcohol, which might conceivably dissolve and remove the essential oils. Our experiments show that alcohol is without effect on the garlic odour. It would appear that the only effective part played by proprietary mouth washes containing alcohol is in masking the breath by the odour of the essential oils with which they are flavoured and which are held in solution by the alcohol.

CONCLUSIONS

The odour given to the breath by onion or garlic comes from the essential oil contained in these vegetables.

The oil does not, as has been suggested, reach the breath from aeration of the blood in the lungs, from pulmonary secretion, from salivary secretion, or in air passed from the stomach. It arises solely from particles of onion or garlic retained in the stricture about the mouth.

Quantitative experiments demonstrate this fact.

The particles from which the odour arises cannot be removed completely by mechanical means; brushing the teeth and tongue and washing the mouth with soap and water fail to deodorize the breath. Similarly washing the mouth with a 30 per cent solution of alcohol is ineffective.

The breath can be immediately and completely rid of the odour by washing the teeth and tongue and rinsing the mouth with a solution of chloramine. The chlorine liberated in the mouth reacts chemically with the essential oils and deodorizes them.

It is probable that many cases of foul breath from other causes would be amenable to the same method of treatment.

Meningococcic Meningitis: A New Form of Therapy

By ARCHIBALD L. HOYNE, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. CIV, 23rd March, 1935, p. 980)

SUMMARY

My experiences during the past one and one-half years seem to justify certain conclusions regarding the treatment of meningococcic meningitis. Meningococcus antitoxin has reduced by approximately 50 per cent the deaths from meningococcic meningitis at Cook County Hospital.

For many years it has been customary in the Contagious Disease Department of the Cook County Hospital to administer antimeningococcus serum intrathecally not more often than once in twenty-four hours. This plan was adhered to when meningococcus antitoxin was given. Lumbar punctures when made every twelve hours or at eight-hour intervals, as sometimes recommended, are extremely disturbing to many patients and seem to be of no added value in lowering the fatality rate.

Although cisternal punctures are much more easily performed by one with experience than lumbar punctures and are often preferred by the patient, this procedure should not be encouraged in a public hospital in which interns and residents are frequently changed. I do not believe that cisternal puncture is necessary in the treatment of meningococcic meningitis in order to secure the most efficient results. It is not essential to adopt this route for the purpose either of drainage or of administration of serum except in case of block in the spinal canal. In no instance among the entire series of 372 patients was an intraventricular puncture required.

In the brief report of a meningococcic meningitis patient treated at Cook County Hospital in 1918, the value of giving antimeningococcus serum intravenously was emphasized. Since that time it has been customary to resort to this therapy for all adult meningococcic cases admitted to my service. The value of this method is still more apparent when antitoxin instead of antimeningococcus serum is the remedy. As our experience with the antitoxin increased, larger and larger amounts of meningococcus antitoxin were given intravenously. The dose ranged from 20 cubic centimetres among the earlier cases up to 100 cubic centimetres and more during recent months. The large amounts of antitoxin intravenously explain chiefly the greater average dose of antitoxin as compared with antimeningococcus serum. On the other hand, the greater the quantity

of antitoxin given intravenously, the smaller the average amount required for intrathecal injection. The most outstanding feature of intravenous and intramuscular antitoxin treatment is the prompt response of the infection and a more than 20 per cent reduction in the period of hospitalization. In fact, it is my impression that eventually it may be regarded as entirely unnecessary to administer any serum intrathecally if sufficient antitoxin is injected intravenously. Under such circumstances lumbar puncture would be done only for the purpose of diagnosis and for drainage.

A problem is now under way to compare the efficacy of intravenous and intramuscular methods of administration supplementing intrathecal antitoxin. One young woman with a fulminating type of meningococæmia whose child died of meningococcic meningitis was treated only by large doses of antitoxin intravenously. Meningeal infection did not progress and she was discharged completely recovered on the seventh hospital day.

For the treatment of meningococcic meningitis with meningococcus antitoxin the following plan may be followed:

1. Intravenously from 60 to 100 cubic centimetres of the antitoxin is administered in from 120 to 200 cubic centimetres or more, respectively, of physiologic solution of sodium chloride or 10 per cent dextrose solution. The smaller amount may suffice for a child, the larger quantity for an adult. This form of treatment may be repeated daily if the condition of the patient seems to require it. As a rule, one large dose intravenously when therapy is started will prove sufficient by this route.

2. Intraspinaly the amount of antitoxin, undiluted, and given by the gravity method, will be governed by the volume of spinal fluid withdrawn. Usually the quantity of antitoxin administered should be less than the amount of spinal fluid released. The initial dose of antitoxin intraspinaly will usually vary from 20 to 40 cubic centimetres. Daily punctures should be made until the fluid is clear and free from organisms. At such a time the cell count of the spinal fluid will generally be less than 100.

3. Intramuscular administration of serum in an initial dose of from 30 to 60 cubic centimetres is of value, but because of the serious nature of the disease the intravenous route is to be preferred.

Reviews

THE DISEASES OF CHILDREN: A WORK FOR THE PRACTISING PHYSICIAN.—(Dr. M. Pfaundler and Dr. A. Schlossmann.) English Translation written by 61 eminent pædiatric authorities. Edited by M. G. Peterman, Sc.B., A.M., M.D. In five volumes. 1935. J. B. Lippincott Company, Philadelphia and London. Vol. I:—General Considerations, Physiology, Metabolism, Nutrition, Special Pathology. Pp. xv plus 544. Vol. II:—Pathology, Constitution, Deficiency Diseases, Diseases of Blood, Endocrine Glands, Circulatory System. Pp. x plus 512. Vol. III:—Infectious Diseases, Rheumatic Fever, Syphilis, Tuberculosis. Pp. vi plus 689. Vol. IV:—Digestive System, Respiratory System. Pp. xii plus 575. Vol. V:—Genito-Urinary System, Nervous System, Motor Apparatus. Pp. xi plus 546. Illustrated by 76 full-page plates in colour and black and white with 1,129 other illustrations in the text, of which 79 are in colour in the set of five volumes. Price, £9-9-0 per set of five volumes. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 141-12

The fourth edition of that monumental work in five volumes has been translated into English—or American—by twenty-two American collaborators and

they have added their own comments. In the preface to the English translation, it is stated, 'The development of our knowledge in the diseases of children, particularly those of infancy, has taken place largely in Germany and Austria. These countries furnished the early training of many of the pediatric leaders of the United States who, in turn, took the leadership after the world war'. Pediatric leaders in other countries will perhaps be excused if they venture to protest against this arrogant statement.

The first volume deals with the history of pediatrics, infant and child mortality, examination of the sick child, general prophylaxis, child welfare, physiology of nutrition and special pathology including diseases of the premature and weak. These points are all fully discussed and illustrated by numerous charts and diagrams. The illustrations, coloured and plain, throughout the work deserve a special word of praise; the coloured being particularly good. One reads with surprise that the active immunization of children against diphtheria is regarded as still in the experimental stage (page 116). One reads with horror on page 132, 'I remove tonsils and adenoids, when it is indicated, always without anaesthesia because it is a much greater psychic shock to the children to anaesthetise them than it is to endure the more unpleasant and painful operation'. It comes as no surprise after reading the above to find that the pre-operative use of paraldehyde per rectum finds no place in the chapter on anaesthetics. The barbarity of the operation and the neglect to mention paraldehyde are equally inexplicable in the year 1935.

The chapter on growth, structure, metabolism and nutrition of the healthy infant is very good. Vitamins in milk are dismissed in half a page and vitamine D is grudgingly admitted as such. More precise directions more clearly explained for both breast and artificial feeds would be welcomed; for instance, it is recommended that breast feeds should be discontinued for the older infant 'at an earlier period than was, . . . required a decade or two ago'.

The chapters on metabolism and nutrition of older children will be read with interest and profit. The advice about meals is excellent. More detailed culinary recipes are required; it is not clear to the English reader how vegetables are to 'be cooked in their own juice'. The pathology of the newborn is well done and beautifully illustrated. The danger of dehydration fever should be known to every doctor, nurse and parent in India. The section on icterus gravis neonatorum needs to be modernized. For the prophylaxis of gonorrhoeal blenorrhoea, 15 per cent mercurochrome is recommended!!! It is presumed that this is a misprint for 1.5 per cent. It should be corrected immediately. The chapters on diseases of premature infants is excellent; the same remarks apply to those on the physiology and pathology of puberty.

Volume II deals with the pathology of the constitution, deficiency diseases, diseases of the blood, endocrine glands and of the circulatory apparatus. The sections on developmental anomalies, obesity and emaciation, rickets, tetany and scurvy are modern and complete. We are surprised to note that the terms microcytic and macrocytic anaemias have not found their way into this work. Diseases of the endocrine glands are fully described. It is evident that the 'lower picture' referred to under figure 108, page 343, has been omitted by mistake. Too much space has been devoted to the development of the circulatory apparatus and not enough to the differentiation between functional and organic murmurs.

Volume III deals with infectious diseases. The illustrations are excellent and will be of the greatest use to students. One is surprised that there is no mention of the experiences of the active immunization of the British Army against the typhoid group of fevers and of the fact that there are two, if not three, types of paratyphoid. The therapy of dysentery in Bauer's article is lamentable; the omission of any mention of emetine for amoebic dysentery and of anti-dysenteric

serum, bacteriophage or salines for bacillary dysentery must be seen to be believed. The chapters on tetanus, encephalitis, acute anterior poliomyelitis and syphilis are excellent. Tuberculosis is well dealt with except for its prophylaxis. One reads with some astonishment on page 632 that vitamine C is especially important for resistance against infections. A brief résumé of tropical diseases helps to fill the gaps left in the treatment of dysentery but here again there is no mention of bacteriophage. The diagnosis and therapy of kala-azar is sadly out of date—even the German product, neostibosan, is not mentioned. There is nothing about atabrin for malaria nor any mention of chaulmoogra oil in the treatment of leprosy.

Volume IV is devoted to diseases of the digestive tract. The translator's note on tonsillotomy resembles our own on the same subject in our notes on Vol. I; it is—'It is considered brutal, especially in the United States, to operate without a general anaesthetic'. We ask why 'especially'? The chapter on the nutritional disturbances of infants will repay the reader. We do not understand the statement that 'The inferiority of cow's milk to breast milk cannot be attributed to the biologic nor to the chemical differences'. Under dietetics there are frequent directions '(see appendix)' but we were unable to find an appendix. The reference to the fifth type of stool—'the dark brownish, thin, liquid hunger stool' is given as Plate VI, figure 4; it should be Plate V, figure 2. Diseases of the stomach and intestines are fully described. The anaesthetic of choice for Ramstedt's operation for congenital pyloric stenosis is not ether but gas and oxygen. We do not admit that medical treatment has any place in the treatment of acute appendicitis in children. In the chapter on intestinal parasites, we were surprised to read that cimetidine is a specific against *Lamblia intestinalis*. Diseases of the respiratory organs are very well described; there are many excellent x-ray pictures of different stages of pneumonia.

Volume V deals with diseases of the genito-urinary and nervous systems. The more modern methods of biochemical investigation and the modern methods of treating various uræmic conditions are not given nor is there any mention of ketogenic diet in the treatment of pyelonephritis. The organic diseases of the nervous system are well described and the same remark applies to functional nervous diseases. The account of the neurosis of childhood is one of the best articles in the whole work.

Throughout the work, one meets with unusual expressions which presumably are American idioms, e.g., 'The diphtheria patient belongs in bed' (p. 64, Vol. III); 'She had cared for a scarlet fever patient' (p. 82, Vol. III); 'One must not, because of this, let up in the least in his attention to the temperature care' (p. 499, Vol. I). There are also a number of most unusual words, e.g., routinely, reinforced, apparatus, asphytic.

There are many excellent chapters in this work but there are others to which that description cannot apply. A great deal of it could be equally well done in a smaller space. The illustrations throughout are extremely good. The printing is very good indeed.

S. A. McS.

THE PRACTITIONERS LIBRARY OF MEDICINE AND SURGERY. Volume VII. Pediatrics. 1935. D. Appleton-Century Company Incorporated, New York and London. Pp. xxxvi plus 1211. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price (both on the cash and instalment basis), Rs. 37-8 per volume

It is not at all difficult to justify the inclusion of this volume on pediatrics in this important and valuable encyclopædia of medical practice. The whole subject of children's diseases has to be approached in quite a different way from that in which the disease of adult life and old age are considered. In the first

place environment, both ante-natal and post-natal, plays a very important part in determining the health of an infant, then diet has a far greater influence than it has on the adult, and, finally, infectious diseases assume both an actual and a relative greater importance, actual because we are more susceptible to infective agents in childhood, and relative because the child does not suffer the disabilities, mental and physical, that can be put down to the wear and tear of the human frame.

The scheme of the book is a very satisfactory one: the first chapters are on anatomy and physiology, infant hygiene, diseases and abnormalities of the newborn, the care of premature infants, and infantile nutrition. The subject of disease proper starts with 'diseases due to defective diets' and then follow a number of chapters in which the subject-matter is arranged regionally, e.g., diseases of the stomach, or according to systems, e.g., endocrine disorders. Finally, specific infections, common poisons, and helminth infestations are dealt with.

The chapters on diet struck the reviewer as being sound and useful. There was, however, here a little evidence of lack of liaison between the writers of the different sections; for example, the vitamins are discussed both in the chapter on infant food and in that on diseases due to defective diets; in the former, the pellagra-preventive vitamin is included in the B complex and there is no mention of a vitamin G, and, in the latter, vitamin G deficiency is referred to as the cause of pellagra without mention of its association with vitamin B.

Another good chapter was that on tuberculosis; this chapter has a number of excellent illustrations, mostly skiagrams. The chapter on diseases of the 'hemolytotoxic organs' (a new expression to us, but a comprehensive one) is a little disappointing. It might so well have begun with a review of the normal blood picture of infants at different ages, and then given some form of classification of blood diseases, but, with a brief apology and reference to a previous volume, the writer seemed just to drift into the subject of anemia.

The chapter on helminthic infections and their treatment is a good one, and the treatment advocated is up to date; tetrachlorethylene is given preference in the treatment of hookworm infection.

Although there are a few uneven patches, the volume has on the whole maintained a high standard. The illustrations are not numerous but are useful, and one of them has been reprinted (with acknowledgments) from the *Indian Medical Gazette*. This volume is quite up to the high standard of the earlier ones; again we remind readers that the whole series may be purchased for cash or on the deferred-payment system from Messrs. Butterworth and Company, Avenue House, Choringhee Square, Calcutta.

AN INTRODUCTION TO COMPARATIVE ZOOLOGY. A TEXTBOOK FOR MEDICAL AND SCIENCE STUDENTS.—By F. G. S. Whitefield, F.R.S., F.R.M.S., and A. H. Wood, M.A. (Cantab.). 1935. J. and A. Churchill, Limited, London. Pp. x plus 354. Illustrated. Price, 15s.

This should prove a useful book especially for students in tropical countries because many of the forms dealt with are found there. The animals chosen also make it specially useful for medical students.

The book is written by two entomologists and as a result the amount of space allotted to this branch of the subject seems somewhat out of proportion. The section on helminthology is not so good and there is an unfortunate mistake, figure 23, facing page 74, shows a scolex with hooks and is labelled *T. saginata* and when this is coupled with the statement on page 69 in the general description of cestoda that in the centre of the head '... is a rounded protuberance, the base of which is furnished with a double ring of curved and pointed chitinous hooks...' the student will be led into the error of thinking that all cestodes bear hooks on the scolex.

There are copious illustrations throughout the book and many of them are on a large scale which makes them easy to follow. This applies especially to the sections dealing with the vertebrates. There is a useful chapter on embryology in which the comparative development of all the groups is well described. This is followed by brief chapters on metabolism, heredity and evolution, the last being made clear by numerous diagrams and tables.

Finally, there is a short chapter on ecology which is of special value as it indicates clearly the importance of the study of zoology from the medical and economic points of view.

This is a book that can be recommended for use in the general scientific course preliminary to the study of medicine especially for those schools that are situated in warm countries.

P. A. M.

THE PRINCIPLES AND PRACTICE OF UROLOGY.

—By Frank Hinman, A.B., M.D. 1935. W. B. Saunders Company, Limited, London and Philadelphia. Pp. 1111 with 513 illustrations. Price, 45s.

Urology is a subject which has become so vast that it can no longer be relegated to a mere section of a textbook on general surgery. This is exemplified by Dr. Hinman's book and he states in the preface that he has written it for three reasons: firstly, because Messrs. W. B. Saunders and Company wanted a one-volume textbook on urology for medical students and general practitioners; secondly, because the writer thought he knew what was required, and, thirdly, because of a contract. The book was not to be written for specialists except to be used by them in the medical education of others.

The author has written a long and excellent book, but we consider it is much more suitable for a specialist than for medical students and general practitioners, as it contains far too much matter and is too wealthy in detail ever to be acceptable to the latter.

There are 1,111 pages of which the first 500 or so are devoted to the embryology, anatomy and physiology of the genito-urinary tract. The embryology is excellently described, and is supported by a great number of diagrams and charts, many of which are complicated in the extreme.

It is open to discussion as to whether such detailed embryology, anatomy and physiology are or are not out of place in a book of this sort. The student and the busy general practitioner want to get to the description and treatment of actual diseases as quickly as possible. It is the specialist who finds interest in examining intricate diagrams and charts such as are illustrated in this volume.

Following on these chapters, there is a very full description of the structure and function of the urinary tract, and the anomalies due to errors in its development; the genital tract is then dealt with in the same manner.

Then follows descriptions of actual diseases, each pathological condition being fully discussed, and methods of examination are given in minute detail. The chapters deserving special mention are those on the effects of urinary obstruction, prostatic enlargement, sterility, sexual neurosis, and gonorrhoea.

Dr. Hinman opens his chapter on the last-named disease with the words: 'There are many who treat gonorrhoea but few are trained to do so'. The specialist knows how true this is.

In dealing with the sterile marriage, the author states that the male partner must be cleared of blame before the female partner is examined, which is certainly correct and in conformity with modern thought. The author then describes an exhaustive examination of the male partner which is ideal, but few men would submit to it.

The book is an excellent one, and contains much detailed information on urological pathology. It is written in an easy style and printed on good paper.

The illustrations must be accorded special mention. They are very good indeed, and the charts and diagrams have been most carefully drawn with scrupulous attention to detail.

H. E. M.

A MANUAL OF ORGANIC CHEMISTRY: FOR MEDICAL STUDENTS.—By S. Ghosh, M.Sc., D.Sc., F.R.S.E., and T. C. Boyd, M.R.C.P.I., F.R.C.S.I., D.P.H., F.I.C., Lieutenant-Colonel, I.M.S. Second Edition. 1935. Scientific Publishing Company, Calcutta. Pp. x plus 257. Illustrated. Price, Rs. 4-12

THE second and revised edition of this little book has now made its appearance. It is as the authors state intended for medical students, a class difficult to cater for as regards chemistry. At the present date the medical curriculum is as much as the student can assimilate and the demand on the specialist teacher to present his subject in a short and concise way is not easy. This book designed for Indian students, especially those of Calcutta and Patna, meets this need in large degree. The extensive use of graphical formulae is a great asset. It not only aids the memory but also brings before the eye the chemical relationships of the different substances met with in the living organism. The authors have picked out here and there substances of medical interest with a short note on their significance which should help to interest the student and above all make him realize the significance of chemistry in medicine. It should never be forgotten that the average medical student regards his pre-clinical studies as so much ground to be got over.

The interested student with a knowledge of inorganic chemistry should be able to obtain the essentials with comparative ease from this book, which is well got up and can be confidently recommended.

H. E. C. W.

DIABETES MELLITUS—A CLINICAL STUDY.—By T. A. Oliver, M.A., M.D., F.R.C.P. 1935. John Bale Sons and Danielsson, Limited, London. Pp. 120. Price, 3s. 6d.

THIS is a well-written and compact little volume dealing with the practical aspects of diabetes mellitus.

The author, who has fifteen years of clinical experience behind him, very rightly lays stress on the variations in the different clinical types of the disease that are met with. In view of the fact that the responses to treatment in these different types are different, an early recognition of the particular type of diabetes one is dealing with is essential for the successful management of the case. Chapters III and IV, more particularly the former, which deals with this subject in a clear and explicit style will amply repay perusal.

We consider it to be a very useful book for students and practitioners.

J. P. B.

BENIGN, ENCAPSULATED TUMOURS IN THE LATERAL VENTRICLES OF THE BRAIN.—By Walter E. Dandy, M.D. 1934. Baillière, Tindall and Cox, London. Pp. viii plus 189, with 83 figures. Price, 20s.

THE tumours in the lateral ventricles causing signs and symptoms the author divides into (1) those that are benign and encapsulated, and (2) those that are invasive or otherwise malignant. The selection of the benign tumours in the lateral ventricles for the basis of a thesis is due to the fact that they alone offer a permanent cure by extirpation. A series of fifteen cases of primary benign encapsulated tumours in the lateral ventricle is reported. All but one were totally removed at operation, with three deaths. Twenty-five additional cases have been collected from the literature and are fully reviewed. The clinical signs and symptoms have been analysed in all cases and the methods of diagnosis and operative removal fully discussed. The other types of tumours are also mentioned and treated from their importance in differential diagnosis. The text is profusely illustrated with photographs of cases, tumours, photomicrographs of sections of the tumours, drawings and some excellent ventriculograms and the whole makes very interesting reading. Both the author and publishers must be congratulated on the production of a useful little book which should arouse interest in the surgical and diagnostic story of a group of tumours occupying the lateral ventricles of the brain.

Abstracts from Reports

RESOLUTION REVIEWING THE REPORTS ON THE WORKING OF MUNICIPALITIES IN BENGAL DURING THE YEAR 1932-1933. (GOVERNMENT OF BENGAL, LOCAL SELF-GOVERNMENT DEPARTMENT)

Public health.—Municipal authorities generally showed energy in taking measures for the prevention and control of epidemic diseases. Inoculation against cholera and vaccination for smallpox were extensively resorted to, and antimalarial measures were widely adopted in co-operation with *Pallimangal Samitis* and other local associations. A smallpox epidemic at Burdwan caused a considerable number of deaths, but the municipality took effective measures in conjunction with the district board, and by resorting to house-to-house vaccinations and chlorination of filtered water, brought the epidemic under control. More prompt action on the part of the municipality immediately after the outbreak of the epidemic might have prevented much loss of life. The Bogra municipality experienced considerable difficulty in dealing with a smallpox epidemic, which was said to have originated in Calcutta, and they had to take substantial help from the district board. An antimalarial scheme was started at Raniganj with the assistance of the public health department and with the help of a Government grant. The Narayanganj municipality took effective steps to remove water-hyacinth from tanks and ditches,

and, by resorting to vaccination on a large scale, was able to reduce the number of deaths from smallpox during the year to four. At Dacca there was a very satisfactory increase in the number of revaccinations from 7,719 to 21,620, while primary vaccinations rose from 4,905 to 6,305. Birnagar worked on scientific lines in fighting malaria, although progress was hampered by lack of funds. Berhampore opened one leprosy and two kala-azar centres, and treated a large number of patients free of charge. It also conducted health examination of the children in its free primary schools, and reported the results to parents and guardians with advice to seek medical help where necessary. Anti-kala-azar and antimalaria centres were opened at Chandrakona and antimalaria societies were formed at Chandrakona and Khirpai. With a view to safeguarding the inhabitants of Chittagong against rabies, the municipality destroyed 353 suspected and ownerless dogs by the administration of poison.

As in the previous year most of the municipalities took steps to improve sanitation by filling up, clearing or disinfecting insanitary tanks, ditches and *dobas* and by removing undergrowth and obnoxious vegetation. Seventeen municipalities in the Presidency Division utilized street refuse, road sweepings and rubbish, with very satisfactory results, in filling up ditches and other insanitary excavations, and notices were freely issued on owners to clear jungles and reclaim tanks. The

Food Adulteration Act appears to have been very unevenly administered. In the Burdwan Division it is reported to have become more or less a dead letter in most municipalities. The Commissioner of the Presidency Division remarks that only 60 prosecutions had been reported, and that the laboratory at Khulna was not being made use of by the neighbouring municipalities. In the Darjeeling district, in which 50 prosecutions took place during the year, the Act appears to have been vigorously administered, but the number of prosecutions in the remaining districts of the division was only 38, the number being nil in the municipalities of Jalpaiguri and English Bazar (Mald). In Dacca 85 persons were prosecuted and 297 mounds of adulterated foodstuffs were destroyed, while the Chittagong and the Faridpur municipalities prosecuted 81 and 71 persons, respectively. On the other hand, Mymensingh prosecuted only 23 persons, and only 4 sellers of adulterated foodstuffs were prosecuted by the Barisal municipality. Generally speaking, district boards displayed much more zeal than municipalities in this respect and several district boards complained of the failure of urban authorities to co-operate in the prevention of adulteration. In towns, where retail trade is extensive, municipal executives are often reluctant to antagonize influential tradesmen by insisting on a high standard of purity in foodstuffs. It is to be hoped that all municipalities will, in future, in the interest of the health of the community, make adequate use of their powers of prosecution under the Food Adulteration Act.

ADMINISTRATION REPORT OF THE PUBLIC HEALTH DEPARTMENT FOR THE YEAR 1931. GOVERNMENT OF TRAVANCORE

It was during the year under review that the public health department was brought into being with its present constitution. Till 5th September, 1933, two separate agencies were functioning, *viz.* the sanitary department and the public health organization. The former dealt only with three phases of public health work—vaccination, rural sanitation and registration of vital statistics. Under the guidance of Dr. W. P. Jacobs, Honorary Adviser, Public Health, the latter organization was working a programme of activities comprising a hookworm treatment campaign, public health education, epidemiological and vital statistical investigations, health unit work, medical entomology and plague control measures. It was considered necessary by Government, in the interest of an efficient public health administration of the State, to effect an amalgamation of the sanitary department with the public health organization so that all the activities might be co-ordinated under a single director. Such a combination was also facilitated by the fact that the services of four medical officers of health with special foreign training in public health work were available. Government accordingly sanctioned the amalgamation of the sanitary department and the temporary public health organization into a new 'Public Health Department' placed on a permanent footing with effect from 6th September, 1933, its immediate control being vested in a Deputy Director of Public Health. The bacteriological laboratory under the medical department was re-constituted as the public health laboratory, embracing the sections of the government bacteriologist, the chemical examiner to government, the public analyst under the food adulteration regulations, the hookworm laboratory and the vaccine depot. The public health laboratory thus newly formed also became a part of the public health department. The year under review is therefore the first year of public health activities undertaken by a co-ordinated and unified organization.

The programme of work included the following:—

- (1) Registration of vital statistics.
- (2) Control of communicable diseases.
- (3) Vaccination.

- (4) Plague control measures.
- (5) Malaria and filariasis surveys and investigations including mosquito and filariasis control.
- (6) Hookworm treatment campaign.
- (7) Public health laboratory.
- (8) Health unit, Neyyattinkara.
- (9) Rural sanitation.
- (10) Public health education.

KING GEORGE THANKSGIVING (ANTI-TUBERCULOSIS) FUND: FOURTH ANNUAL REPORT, 1934

This fund is the nucleus of anti-tuberculosis activities in India and represents the national effort to fight tuberculosis. The fund would enlarge its scope of work if money were available, but with its limited resources its activities have to be restricted. At present they direct their energies to bringing home to the public the necessity and urgency of the problem. They have set themselves to organize a propaganda and educative campaign in the Provinces of British India as well as in the Indian States with a view to educating the people about the causes and preventive measures against tuberculosis, and to creating a public conscience so that efforts may be made in all directions to fight the disease.

During the year under review the educative and propaganda campaign was carried out through 16 Provincial and State Anti-Tuberculosis Committees, Medical, Public Health and Education Departments, Sanatoria, Medical Colleges and Schools throughout India.

The outstanding event of the year was the bringing together of tuberculosis workers from all over India to afford them an opportunity of meeting and exchanging views. At this conference various papers were read and stimulating discussions took place. A report of the transactions is in press and will soon be available.

The chief aim of the fund is to organize a propaganda campaign against tuberculosis and to publish suitable material for distribution and utilization by various agencies and departments engaged in the prevention and control of tuberculosis. We have now a large amount of propaganda material in the shape of charts, picture posters, pamphlets, leaflets, films and slides, etc.

The attractive and multi-coloured picture posters on causes and prevention of tuberculosis, which were published last year for the first time, have proved very popular and another 5,000 copies of each had to be re-printed, while the colours have been improved. These have been widely distributed by the Provincial Anti-Tuberculosis Sub-Committees, Surgeons-General and Inspectors-General of Civil Hospitals, Directors of Public Health, Directors of Public Instruction and Chief Medical Officers of Railways, etc. These have been in such great demand that another 5,000 copies of each of these picture posters have had to be printed.

The printing of a set of six pictorial charts on signs and symptoms of tuberculosis has also been sanctioned and is under preparation.

The following two new films on tuberculosis were purchased during the year:—

1. *Posture* (two reels) with titles in English.
 2. *Consequences* (one reel) with titles in English.
- Standard size.

The first film, *Posture*, presents new material on and its relation to physical fitness. The first reel is a more or less general showing, through the medium of the bony framework of the body, the effect of posture on the body. The second reel is devoted to showing important posture exercises. The other film on *Consequences* is based upon the slogan 'Early Discovery—Early Recovery', showing in vivid manner the cause, diagnosis and cure of tuberculosis.

The films on tuberculosis have been in great demand and exhibited at a large number of places in various Provinces and States. The film on *Causation and*

Prevention of Tuberculosis, prepared locally by us, has proved popular and two copies of it were sold during the year.

Propaganda cinema lorry.—A cinema lorry has been fitted up at headquarters; this will tour in the Provinces with a view to carrying out an intensive propaganda campaign against tuberculosis by means of cinema films. There will be a qualified medical man in charge of the lorry who will give lectures and show films to the audiences in the districts and villages.

The fund aims at improving the training of medical students and medical practitioners, so as to equip them to give the unfortunate victims the benefit of up-to-date methods of diagnosis and treatment.

Treating the disease early and properly is rewarded by arrest and cure. With this end in view, grants are made to several medical schools from time to time and a special training course in tuberculosis has been arranged at Calcutta with the co-operation of Lieutenant-Colonel A. D. Stewart, Director of the All-India Institute of Hygiene and Public Health, Dr. A. C. Ukil, Lieutenant-Colonel Boyd, the Principal of the Medical College, Calcutta, Dr. K. S. Ray, the Superintendent of the Jadabpur Sanatorium, Dr. Galstaun, the Radiologist of the Medical College and Dr. Remfry, Honorary Secretary of the Bengal Tuberculosis Association, to whom our thanks are due. The class will consist of 25 medical practitioners from all parts of India who have been selected from over 100 applicants, and will be held from the 4th to 23rd February, 1935. The demand has been so keen that another course is contemplated.

The fund aims at arousing public opinion and enthusiasm to fight tuberculosis. There are some hopeful and encouraging signs. We find that all over India, especially in big cities and towns where the problem is acute, people are talking about the tuberculosis problem, the press is writing about it and cities are waking up. To name a few, Agra, Ajmer, Allahabad, Cawnpore, Delhi, Jullundur, Multan, Ranchi, Shillong, and many others scattered far and wide are setting up tuberculosis dispensaries, clinics or hospitals and are raising funds running into thousands of rupees. We find that the railway authorities in India are also contemplating schemes of prevention and treatment and we dare to say the day is not far distant when Central and Provincial Governments will contemplate how best to protect their employees and their families from falling victims to this disease. Such an awakening cannot but be a source of satisfaction to all who have the welfare of India at heart.

QUARTERLY REPORT OF THE MYSORE STATE DEPARTMENT OF HEALTH, 1ST JANUARY TO 31ST MARCH, 1935

Stations for the study of malaria

A new research station financed by the Rockefeller Foundation was opened from 1st January, 1935, at Gargeswari, T.-Narsipur Taluk, 15 miles from Mysore, to study the causes for the low incidence of malaria in this area which is similar to the Nagenahalli area in all respects. Five villages all within a distance of a mile of each other situated on the banks of the two rivers Cauveri and Kapini are under study. The spleen rates in these five villages vary from about sixty-five per cent to two per cent. The anophelines of the carrier species will be investigated with respect to the possible existence of races with different feeding habits to account for this vast variation in the incidence of malaria within such narrow limits.

The scheme for the experimental control of malaria in 10 of the heavily malaria-affected villages round about Mandya town was sanctioned by Government under joint agreement with the Rockefeller Foundation. The work of this special unit was started during the quarter and the 10 villages have been selected for malaria control by anti-larval measures with Paris green. It is proposed to control anopheline breeding

within a quarter of a mile round each village. This area is divided into six sections and each section is Paris-greened once a week by one man working morning and afternoon for six days in the week. The work of the field man is checked by one assistant sanitary inspector and the officer in charge.

Four adult catching stations have been selected for each village where anopheline mosquitoes will be caught once a week, as usual. Spleen and blood examinations have been made at the start and it is proposed to repeat these half-yearly. Spleen examinations in a few selected villages in the same area are also made to serve as controls.

A one per cent Paris green mixture with ash and road dust as diluent is used. The mixing is all done at the central office at Mandya and the prepared mixture, enough for a week, is stocked in each village. It is estimated that the cost of malaria control for these 10 villages will be about Rs. 800 per village per year.

The control work in the three study stations is being continued, as usual. The work of all these stations was inspected by the Superintendent, Dr. Paul F. Russell of the Rockefeller Foundation visited the malaria stations with the Consultant in Health during the quarter.

The possibility of using the powdered root bark of one of the indigenous plants *Mundulea suberosa* growing wild in all parts of the State was investigated during the quarter. The first laboratory trials were done by the late Dr. Kunhi Kannan who discovered this during his field studies as a commonly used fish poison.

During the present investigation different samples of the powder supplied by the entomologist of the Agricultural Department were tried in the laboratory and the sample from Banavar was found to be most toxic being lethal to both the culex and anopheline larvæ in 24 to 48 hours. But the powder was practically ineffective against these larvæ under field conditions. But small fish, tadpoles, and frogs were effectively destroyed in the areas sprayed with this powder.

The mosquito control work in the mining area of the Kolar Gold Field was inspected on the request of the chief medical officer of the mines. The method adopted for mosquito control in the area is (1) permanent minor engineering works wherever possible, (2) anti-larval measures by spraying pesterine, and (3) house inspections for possible culex breeding places.

ANNUAL REPORT OF THE CHEMICAL EXAM- INER TO THE GOVERNMENT OF MADRAS FOR THE YEAR 1934

HUMAN POISONING CASES

OLEANDER heads the list with 41 cases, opium or its alkaloids come next with 24 cases, closely followed by datura or mydriatic alkaloid with 23 cases. There has been a surprisingly large increase in the datura cases.

The following cases are selected as of interest:—

Mercury.—(1) A man was suspicious of his wife's conduct and there had been frequent quarrels between them. One evening on returning from work he found his wife absent from home. He went in search of her, found her and asked her to return home to serve him food but she refused. He went home and began to eat the food that had been prepared by his wife early in the evening. It had a queer taste and suspecting that his wife might have poisoned it, he reported the matter to the village magistrate. It was forwarded to us and we found in it about 17½ grains of corrosive sublimate.

(2) A man was given poisoned milk and he died four days later. In the viscera only very minute quantities of mercury were found whereas in the vomit that had been collected there was 25 grains of corrosive sublimate.

(3) A man, aged 40 years, was arrested and escorted by the police from Palni to Melur. On the way his escort allowed him to drink coffee at a hotel after which he had severe abdominal cramps and vomiting.

He was admitted in hospital where he died about a fortnight later. Before his death he confessed to having swallowed perchloride of mercury in the coffee. In this case we found extremely minute quantities of mercury in the viscera but one of the vomits sent to us showed about 1-1/6th grains of corrosive sublimate.

(4) In two cases in each of which death was very rapid we found large quantities of corrosive sublimate in the viscera—30 grains in one case and 50 grains in the other.

It is interesting that in fatal cases of mercuric chloride poisoning, if the victim lives for some time after taking the poison, only very small amounts are still to be found in the viscera.

Copper.—There were four cases of poisoning by copper sulphate all suicidal, two of which proved fatal:—

(1) A man attempted to commit suicide by swallowing copper sulphate. He was removed to hospital. In his stomach contents we detected copper equivalent to about a quarter grain of crystalline copper sulphate. The man recovered.

(2) A woman who, as a remedy for abdominal pains, took some blue stone in butter-milk was removed to the hospital in a collapsed condition. From one of the vomits preserved we obtained copper equivalent to about two grains of crystalline copper sulphate. She recovered.

(3) A man, aged 25, unable to bear pain in the abdomen swallowed copper sulphate to put an end to him-self. He was removed to hospital at 7 p.m. and died at 4 a.m. the next morning. We found in his viscera copper equivalent to about 25 grains of crystalline copper sulphate.

(4) A young man, aged 19, a student, swallowed some copper sulphate from the laboratory. He died the same day. We found in his viscera copper equivalent to about 25 grains of crystalline copper sulphate.

The post-mortem appearances of poisoning by copper sulphate are worthy of note. In each of the above two fatal cases rigor mortis was present at the post-mortem examination. The features were pinched and the pupils were semi-dilated. The pericardium contained some serous fluid. The right side of the heart was full and the left side was empty. The pulmonary vessels were engorged and both lungs showed intense congestion. There was also congestion of the liver, the gallbladder being half full. There was also intense inflammation of the stomach, the mucous membrane being corroded in places with patches of hæmorrhage and necrosis. The intestines were intensely inflamed. The gastro-intestinal tract was stained blue in numerous places. The brain and the dura were also congested.

Powdered glass.—A servant, at the instigation of some persons who wanted to kill the inmates of the house where he was serving, while the milk was boiling put powdered glass into it. A little later, a portion of the milk was used to feed the baby and while the rest of the milk was being poured into another vessel particles of glass were found at the bottom. The child did not suffer from any symptoms probably because the glass powder had settled at the bottom of the milk. The stone used for powdering the glass, a coconut shell in which the powder was conveyed to the house, the vessel with the milk and some powder collected from the place where it had been originally pounded, were sent to us and we found powdered glass in each of the items.

Barbituric acid.—A woman, aged 30, was brought to the hospital with a history that she had swallowed some seven or eight tablets of some-yl. She was drowsy, not answering questions; her pupils were slightly contracted, equal and reacted to light. The conjunctival reflex was present. The pulse rate was 115 per minute, regular and of fair volume and tension. The respirations were 23 per minute and regular. In the stomach wash sent to us we detected a derivative of barbituric acid. The woman recovered.

Aconitine.—(1) Three children were given a decoction of some root with castor oil. They became restless and developed tingling of lips and tongue, burning sensation in the stomach with numbness in the body and inability to walk. Two of them died. From the stomach of one of the victims we obtained aconitine but could not find any in the stomach of the other. There is little doubt that both died of aconite poisoning. Our inability to find it is noteworthy as showing how difficult it may be to find it in the stomach even when the patient has been poisoned by it.

(2) There was a case of ordeal by poison. A gold necklace was lost in a house. A man who was said to be an adept in the occult arts was brought by the owner to trace out the culprit. Ten possible suspects were assembled and each of them was given something to chew in betel leaves. One of them had vomiting and purging but recovered in hospital. Some pieces of root were sent to us in connection with this case and we identified the root to be aconite.

Strychnine.—A man died suddenly with 'epileptic fits' and it was only because the inmates of the house were his enemies that the viscera were forwarded to us. We detected strychnine in the viscera.

Picrotoxin.—A woman was found at bedtime to be suffering from pain in the stomach with vomiting and convulsions. She died at about 4 a.m. the next morning. The viscera were sent to us but we had no information as to the nature of the poison swallowed. We obtained from the viscera an acid ether extract which (1) was crystalline, (2) reduced Fehling's solution, (3) killed a frog with convulsions, (4) gave a brick-red colour on treatment with potassium nitrate and concentrated sulphuric acid followed by addition of solid potassium hydroxide, and (5) gave a bright red colour on treatment with a solution of benzaldehyde in absolute alcohol followed by the addition of concentrated sulphuric acid. We did not obtain any alkaloid from the viscera. We therefore concluded that the acid ether extract we had obtained was picrotoxin, the active principle of *Cocculus indicus*.

Eucalyptus oil.—(1) A man fell accidentally and feeling giddy as a result of the fall is stated to have taken as a remedy about one ounce of eucalyptus oil. About an hour later he was taken to hospital with severe pain in the stomach and nausea. His pulse rate was 116 and respirations 28 per minute. The stomach wash sent to us showed the presence of eucalyptus oil. The man recovered.

(2) In another case death was attributed to swallowing a few drops of eucalyptus oil on sugar. The post-mortem report stated that death was due to acute influenzal pneumonia. We did not detect eucalyptus oil or other poison in the viscera.

Eucalyptus oil in this country does not seem to be such a poisonous substance as in England; this is possibly due to adulteration.

Madar juice.—There were two cases of death from drinking madar juice. From the viscera of each of the two cases we obtained the reactions of madar juice as described in the annual report for 1933.

As the post-mortem appearances with this poison have been but little described we give them in detail.

(1) In the first case (a woman aged 25), the post-mortem signs were as follows:—The eyes were closed. There was discharge of blood from the nostrils. The left side of the heart was empty and the right side contained a small quantity of blood. Both the lungs were congested, red in colour and of soft consistency. The liver was normal with the gallbladder empty. The spleen and the kidneys did not show any marked signs. The stomach was distended, the lesser curvature being congested, and containing four ounces of a brown liquid. There were no appreciable signs in the intestines. The uterus was normal and the bladder empty. The brain substance was softened due to decomposition.

(2) In the second case (a man, aged 65) the body was decomposed but the following signs were present:—There was no discharge from the nostrils or mouth.

The pleura was adherent on the left side and also at the base of the right lung. This is presumably an old scar. The pericardial cavity contained 2½ ounces of red fluid. There was clotted blood in the right side of the heart and the left side was empty. The heart was dilated. The lungs were grey and friable. The liver, spleen and kidneys were normal. The outer surface of the stomach was congested. The intestines were decomposed. The membranes of the brain were vascular and the surface of the brain was reddish in colour.

Gloriosa superba.—A man, aged 45, was found with violent gastro-intestinal symptoms in the morning and, when questioned by his neighbours, stated that he had eaten the root of *Gloriosa superba* in order to commit suicide. He died between 4 p.m. and 6 p.m. the same day. At the post-mortem examination the body was somewhat decomposed. The eyes were half open and there was frothy blood-stained fluid from mouth and nose. The features were relaxed. The heart was dark red, the right side of the heart containing dark fluid blood mixed with clots and the left side only a few clots. The lungs were soft, dark blue and congested. The pleurae were also congested. The peritoneum was injected. The liver was dark red and congested and the gallbladder contained about a quarter ounce of thick bile. The spleen was dark blue and soft. The kidney was dark red and congested. The mucous membrane of the stomach was slightly injected and there were about two ounces of thick greyish-white liquid mixed with small bits of some white vegetable inside the stomach. The intestines were slightly injected. The bladder contained half an ounce of reddish urine. The membranes of the brain were congested and the brain substance was soft and congested. The viscera were sent to us. We obtained from them a poisonous extract similar to that from *Gloriosa superba*.

'Karu Veeerathalai' leaves (Elæodendron glaucum, Pers.).—We received last year a case of poisoning by drinking a decoction of the leaves of the plant. The symptoms were not stated. At the post-mortem examination the heart cavities were found to be empty. The lungs were soft and slate-coloured; the stomach and intestines were congested with a thick yellow liquid in the latter, and the membranes of the brain were vascular. We obtained from the stomach a poisonous resin similar to the poisonous extract obtained from the leaves and bark of *Elæodendron glaucum*. This plant is a shrub occurring in the hotter parts of India. In Watt's *Dictionary of the Economic Products of India* it is stated that the root is a 'specific' against snake bite (whether internally or externally it is not stated). The bark is stated to be used in native medicine and to be a virulent poison. The leaves are said to be used as a fumigant to rouse women from hysterical fits. The leaves and bark were examined in this laboratory and both yielded a poisonous resin which gave in chloroformic solution with acetic anhydride and sulphuric acid a green colour (Lieberman reaction). The resin was found to be freely soluble in chloroform and sparingly soluble in ether and in petroleum spirit.

'Jammi leaves' (Prosopis spicigera L.).—Some leaves were received said to have been used in a suspected poisoning case but we did not however detect poison in the viscera. The leaves examined here gave a poisonous acid ether extract which did not give the Lieberman reaction for resin. It gave a brown colour when dissolved in acetic acid containing ferric sulphate and floated on sulphuric acid containing a trace of iron (Keller's reaction). The extract did not reduce Fehling's solution. The leaves were identified by the agricultural botanist, Coimbatore, to be those of *Prosopis spicigera* L.

Oleander.—Thirty-six of the forty-one cases in which oleander was detected were fatal. The symptoms of oleander poisoning, so far as can be gathered from the histories furnished, appear to be tingling of tongue, shivering of hands and feet and later of the whole body, epigastric pain, vomiting, in a few cases purging, rapidity and failure of pulse, and asphyxial symptoms.

In some cases convulsions also occurred. Unconsciousness set in only towards the end.

The post-mortem notes revealed that in about half of the fatal cases the heart was contracted and all its chambers were empty. In about a third of the cases the right side of the heart was filled with dark blood and the left side of the heart was empty. In practically all the cases the lungs were congested. There was also congestion of liver, spleen, kidneys and brain in most of the cases and the stomach and intestines showed patches of congestion.

The cases we received were mostly suicidal and it seems as if oleander is taking the place of opium as the poison of choice for suicide.

Scorpion sting.—Cases of death from scorpion sting are very rare. What would appear to be a genuine case occurred in a man aged about 38 years who was stated to be apparently in good health. He was stung by a scorpion at about 3-30 p.m. and died in 10 minutes. The post-mortem examination revealed not only evidences of heart failure but also the presence of caseating tubercles at the apex of the right lung. The scorpion that stung him was enclosed in a match box and forwarded to us along with the viscera. As we were not told in the letter of advice whether the scorpion sent to us was a live one or a dead one, we opened the match box with due precautions only to find a dead scorpion. It was of ordinary size about two inches in length from the head to the tip of the tail—not a specimen the sting of which could have been expected to prove fatal to a normal adult. We did not find any poison in the viscera.

ANNUAL REPORT OF THE DIRECTOR, LEAGUE OF NATIONS, HEALTH ORGANIZATION, EASTERN BUREAU, SINGAPORE, FOR THE YEAR 1934

We have received the annual report of the director of the League of Nations, Health Organization, Eastern Bureau, Singapore, for the year 1934.

This report does not lend itself to abstraction but it is an extremely valuable production and all health authorities in Eastern countries should be in possession of it as it gives a very useful summary of the prevalence of important epidemic diseases throughout the entire Eastern area which includes all countries from the East African coast to Japan and Australia.

REPORT OF THE COMMISSIONER OF PUBLIC HEALTH, SHANGHAI MUNICIPAL COUNCIL, PUBLIC HEALTH DEPARTMENT, FOR THE YEAR 1934

Despite an abnormally hot summer with a rainfall approximately eleven inches below the average the year has, on the whole, been comparatively free from any major communicable or other diseases. The foreign mortality rate, namely, 11.34 per mille, which includes all Eastern races other than Chinese, compares favourably with that of the principal cities throughout the world, though it is only fair to point out that, to some extent, the Settlement is in a favourable position inasmuch as many of the older inhabitants retire and also some of the more youthful return to their homes, with the result that a proportion of its mortality (which would otherwise increase the death rate) occurs elsewhere.

The Chinese death rate of 14.25 per mille would also be described as a very favourable figure were it not for the fact that faulty registration and other factors, over which the department has no control, cause this figure to be of no real value in judging the general health of the population.

In regard to communicable diseases, during the early part of the year smallpox was prevalent, reaching what is usually described here as the epidemic state of 21 new cases per week during the months of January and March. However, considering the population factor

the epidemic was a very minor one and of short duration.

The practical absence of cholera for the second year in succession was a notable fact. Possibly, since the regular cycle has been broken, we may hope that next year, which if the cycle followed its normal course would be one of severe incidence, may also be one of comparative freedom.

It is to be noted as a matter of interest that such periods of interruption in the cycle are to be found during the years 1896 to 1902 and 1907 to 1912, and that the only cyclical phenomenon observed in Shanghai during the last few years is that years of epidemicity not infrequently follow on two years of increasing incidence, and not so far as can be seen on years of slight incidence. However, it is impossible to predict on a matter of this importance without further data than are available at the present time.

In spite of the absence of cholera as chronicled above, the incidence of diseases of the enteric group, such as typhoid and the dysenteries, remains too prevalent. Typhoid shows a steady incidence which does not seem to have been materially affected during the last few years by the various prophylactic measures taken, and while the increase is due in part to improved notification it would seem that some further steps are necessary for its prevention. One important step may be represented by the measures proposed for the general pasteurization of milk.

ANNUAL REPORT OF THE HEALTH DEPARTMENT, MUNICIPALITY OF SINGAPORE, FOR THE YEAR 1934

Cholera, plague and smallpox

ONCE again a year practically free of cholera, plague and smallpox has occurred.

There has been no case of cholera for six years, and, with the exception of a single isolated case in 1933, no plague for five years.

There was one case of smallpox. It was of the hemorrhagic variety and the patient, an elderly Chinese woman, died a few days after admission to hospital. Though exhaustive enquiries were made, the source of origin could not be traced and no connection with any previous case could be established. The patient's home was an insanitary plank-and-attap hut in Serangoon Road. It was impossible to disinfect it properly so that it was deemed safest to demolish and burn it. Contacts from it and neighbouring huts, to the number of 27, were sent to St. John's Island to undergo the usual quarantine period.

With regard to plague prevention generally, the usual modified rat trapping was carried on throughout the year—both in the Port and the town proper. Three thousand seven hundred and thirty-six rats so trapped were dissected, but none were found infected.

BENGAL PUBLIC HEALTH REPORT FOR THE YEAR 1933. BY DR. R. B. KHAMBATA, D.P.H., DIRECTOR OF PUBLIC HEALTH, BENGAL

Cholera

CHOLERA claimed 29,242 deaths in 1933 giving a death rate of 0.6 per mille against 33,910 deaths and a rate of 0.7 per mille in 1932, thus showing a decrease of 14.3 per cent.

It was 60.0 per cent less than the average of the previous quinquennium (1.5). 2.4 per cent of the total deaths in the province in 1933 was due to cholera. Reports of cholera deaths were received from 527 out of 672 circles of registration and from 7,897 out of 86,360 villages in the province against 587 out of 672 circles and 10,087 out of 86,360 villages, respectively, in the previous year.

In January 1933, 2,421 deaths from cholera were reported. The mortality steadily rose up to 8,287 in April. It slowed down to 306 in September. From

December it again began to rise. Compared with the previous decennium, the death rate was lower in all the months.

Preventive measures

Inoculation.—1,232,530 cubic centimetres of anti-cholera vaccine was issued in 1933 against 1,001,690 cubic centimetres in the previous year. The total number of inoculations performed was 1,306,643 against 952,105 in 1932.

Disinfection.—146,910 wells and 30,207 tanks were disinfected against cholera in 1933 in addition to 3,242 river ghats, 466 houses and one *jhil*.

Inoculation of pilgrims to the Puri Rathajatra, Ganga Sagar mela and the Haj.

Assistance was given to various local bodies in anti-cholera work.

Magic lantern and bio-scopic film demonstrations together with the distribution of leaflets and posters on cholera were also carried out.

Smallpox

Smallpox claimed 15,426 victims in the province in 1933 against 7,910 in 1932. The death rate was 0.3 per mille in 1933 against 0.2 in 1932, and 0.4 the mean of the previous five years, showing a reduction of 25.0 per cent against the latter and an increase of 50.0 per cent in the former. Smallpox was responsible for 1.3 per cent of the total provincial mortality against 0.77 in 1932. Five hundred and two registration circles and 4,359 villages were affected with smallpox in 1933 compared with 366 circles and 1,995 villages.

From December 1932 smallpox was on the increase, reached its height in April 1933 and declined steadily from May, the mortality came to its lowest in November. In December 1933 it again began to rise. As compared with the previous decade, the death rate in 1933 was lower in every month except in February.

During the year there has been a decrease in the number of vaccinations by 45,889 persons. There was a slight increase in the number of primary vaccinations and of children successfully vaccinated under one year and one year and under six years. Owing to outbreaks of smallpox in several districts during the year, the total number of vaccinations during the recess season has increased by 185,975 operations over that of the previous year.

Plague

In Bengal only one death from plague occurred, *i.e.*, in Calcutta in December 1933.

Fevers

Deaths from fever numbered 812,393 in 1933 against 691,513 in 1932. The death rates from fever were 16.3 per mille in 1933, 13.8 in 1932 and 14.4 during the last quinquennium. The fever death rate in this year thus increased by 18.1 per cent compared with the previous year and by 13.2 per cent with the last quinquennium. There was a general increase of death rates from all kinds of fever in 1933. Fevers accounted for 67.8 per cent of the total provincial mortality against 67.6 per cent in the previous year.

Malaria

Malaria was responsible for 413,922 deaths with a death rate of 8.3 per mille in 1933 against 327,386 deaths with 6.6 death rate per mille in 1932. The number of deaths thus increased by 86,536 showing a rise of 25.7 per cent in the death rate. Malaria accounted for 50.9 per cent of total fever mortality and 34.5 per cent of the total provincial mortality in 1933 against 47.3 and 32.0 per cent, respectively, in 1932.

13,329.4 pounds of quinine was consumed in 1933 against 9,031.3 in 1932. Except Burdwan, Hooghly and 24-Parganas, all other districts in Bengal showed increased quinine consumption. The fever indices fell, however, only in the districts of Calcutta and 24-Parganas in the year under report. The average quinine consumption per head of population was highest in Chittagong as in the previous year.

Kala-azar

Thirteen thousand four hundred and forty-seven deaths from kala-azar were registered in 1933 with a death rate of 0.27 per mille. Six hundred and eighty-nine deaths were returned from towns, of which 223 occurred in Calcutta and 12,758 in the rural areas. Compared with 1932, the death rate in all Bengal towns increased by 11.1 per cent but in Calcutta it decreased by 5 per cent. In rural areas, the number of deaths increased by 2,684, the death rate having increased by 28.5. Twenty-nine towns returned rates above the provincial urban average (0.2), the highest mortality from kala-azar (2.1 per mille) having been registered in Kalna. Out of 118 towns, 45 did not record any death from kala-azar. Kala-azar accounted for 1.6 per cent of fever deaths and 1.1 per cent of the total provincial mortality against 1.5 and 1.04 per cent, respectively, in 1932.

Dysentery and diarrhoea

The total number of deaths reported from dysentery and diarrhoea in 1933 was 46,697 with a death rate of 0.9 against 39,562 deaths with a death rate of 0.8 per mille in 1932. The death rate thus increased by 12.5 per cent against the previous year rate as well as the last quinquennium average (0.8). Twenty-four thousand three hundred and nine males and 22,388 females died from these causes. Taken separately, dysentery accounted for 25,980 and diarrhoea 20,717 deaths in 1933 against 21,539 and 18,023, respectively, in 1932; the corresponding ratios were 0.5 and 0.4 against 0.4 in each in 1932. Dysentery and diarrhoea accounted for 3.9 per cent of the total provincial mortality against 3.8 per cent in 1932.

Respiratory diseases

Respiratory diseases were responsible for 82,173 deaths in 1933 with a death rate of 1.6 per mille against 62,249 deaths with a death rate of 1.2 per mille in 1932, showing an increase of 19,924 deaths or 33.3 per cent. The death was higher by 45.4 per cent than the provincial quinquennium average.

Pneumonia

Pneumonia has kept up a steady rise since 1923 and was responsible for 9,179 additional deaths compared with 1932 figures. The total number of provincial deaths from pneumonia in 1933 was 37,337 with a death rate of 0.75 against 0.56 per mille in 1932. The death rates showed increase both in the rural and the urban areas as well as in Calcutta by 41.7, 3.6 and 14.3 per cent, respectively.

Phthisis

Deaths reported from phthisis numbered 14,802 in the province in 1933 showing an increase of 3,001 against the previous year. The increase was shared to the extent of 2,583 by the rural areas and 418 by the towns, of which Calcutta was responsible for 315. The provincial death rate from phthisis showed an increase of 30.4 per cent. The increase in the rural areas and towns was by 33.3 and 13.0 per cent, respectively, while that in Calcutta was by 14.2 per cent. 70.6 per cent of the phthisis deaths in all towns occurred in Calcutta. Eleven towns reported death rates above the provincial urban average (1.0). Eighty-six towns returned rates between 1.0 and 0.1 inclusive per mille. Pabna recorded the lowest rate (0.04 per mille). No death from this cause was reported from 20 towns.

Fairs and festivals

During 1933, no case of infectious disease was reported from any fair in the Burdwan, Rajshahi and Chittagong Divisions. A few cases of cholera occurred at the Nangalbundh mela in the Dacca district. Ganga Sagar mela in the 24-Parganas district was free from infectious diseases except two imported cases of smallpox.

Anopheles ludlowi

Ludlowi menace to Calcutta.—It has been stated in the previous years' reports how the discovery of *A. ludlowi* with a natural infection rate of 23.8 per cent in the jute mill areas at Budge-Budge in October 1930 led to careful investigation into the matter by the specially sanctioned staff for the purpose and how, as the result of this investigation, *A. ludlowi* was found to be breeding not only in several spots on the outskirts of the city but also within the municipal limits of Calcutta. The timely action taken by Government, with whom the Corporation of Calcutta and several other bodies concerned subsequently co-operated, has averted an outbreak of malaria which might have been disastrous to the port and the city of Calcutta. The 'ludlowi' survey and the control work was continued in 1933 as energetically as before. In 1933, this species of anopheles was detected in the fish ponds of the villages situated on the western border of the salt lake and close to the fringe of Calcutta. On the northern border, the village Kalikapur was also affected. In February 1933, Chingrighata was infested and at about the same time breeding places of the species were detected in the Nebugola area of the Calcutta Corporation. In March to May breeding places of *A. ludlowi* were found scattered over Calcutta in an area within half a mile from the western border of the salt lake. In July, an outbreak of malaria took place at Nebugola within the limits of the Calcutta Corporation and also its adjoining areas, and *A. ludlowi* was found to be responsible for the outbreak. In August to October breeding places were detected at Golaghat and in the Lansdowne jute mills and also within the limits of Calcutta between Maniktala and Narikeldanga. In November and December the Bellaghata and Shambazar canals were found to be breeding *A. ludlowi*. On the southern border of the salt lake, villages near the railway station of Garia were also found to be infested. On the banks of the Hooghly, in addition to the previously affected places, the following new places were found infested with *A. ludlowi*, viz, Fuleswar, Bauria (adult *A. ludlowi* was found in 1930), Belur, Dakshineswar and Mankundu. Adults only were caught from Mayapur, Pijuli and Telinipara. As in the previous year, adults were caught from the trains at the railway stations of Majerhat, Howrah and Shambazar and stations in the Canning area and Hasnabad area were found infested.

In January 1933, the attention of the Calcutta Corporation was drawn, at a meeting, by the Bengal Public Health Department to the important development in the salt lake area and asked for their co-operation to prevent *ludlowi* invasion into Calcutta. The Bengal Public Health Department with only one unit of survey and control had to face the danger. Later, when an epidemic of malaria actually broke out at the Nebugola, Chingrighata and their adjoining areas, the Corporation offered a contribution. Major Covell's recommendations for augmenting the special staff were then given effect to. The new units, however, could not be put to work before the middle of July 1933, but an epidemic of malaria on the eastern limit of Calcutta had already started. Since then, the Bengal Public Health Department has been carrying on both the survey and the control work in the salt lake area and only the survey in the areas within the Calcutta Corporation from Ultadanga to Chingrighata, where the mosquito brigade of the Corporation carry on control measures.

Antimalaria scheme for rural areas with quinine and plasmochin.—In April 1933, an antimalaria experiment with quinine and plasmochin was taken up for certain selected areas in the Burdwan district. This area comprises 97 villages with a population of 21,400, of which 30 per cent are children. The spleen index in this tract varied from 60 to 80 per cent. The scheme provided for a course of treatment with quinine to the whole of the population inhabiting the area during the months of April, May and June. Along with quinine treatment, plasmochin was given in daily doses of

0.02 gramme in the case of adults and proportionately less in the case of children for three consecutive days to kill the gametocytes in the system. From July onwards, 30 malaria treatment centres were opened for the area. Six doctors were placed in charge of each group of 5 centres which were visited in rotation. Malaria cases were treated with quinine and plasmochin.

The argument in support of this scheme is that malaria increases in geometrical progression during the period from July to October; this provides favourable conditions for mosquitoes to multiply and for parasites to develop in them. From November, such conditions do not continue. The height of the seasonal peak will, therefore, depend on the initial number of infected cases and the length of the favourable period. If, for instance, 30 per cent infected persons, i.e., in the month of June, can give rise to 50 per cent sickness rate in November in five months' time, then a 20 per cent initial rate will cause a proportionately lesser rise

during the same period. Now, if the initial number of cases can be reduced by treatment in June, the virulence of the seasonal epidemic would most probably be reduced. The centres have been opened to test the efficacy of control on these principles and also to provide early treatment of malaria cases, so as to prevent, as far as practicable, diffusion of malaria by infected mosquitoes.

The intensity of malaria during the malaria season in the area under experiment was far less than that in the surrounding areas. Compared with the previous years, malaria incidence in the same area is reported to have undergone a decrease. The success of the scheme will depend upon the number of people coming under this treatment and on the efficiency of quinine in the cure of malaria. A large proportion of the population inhabiting the area are loath to come under this treatment. The Santals refuse allopathic treatment.

Correspondence

BASAL METABOLISM OF INDIANS IN HEALTH AND DISEASE: ITS CLINICAL SIGNIFICANCE

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In the November issue (1931, page 601) of the *Gazette* there is an article on 'Basal metabolism of Indians' by Dr. J. P. Bose and Mr. U. N. De. In this article (page 610) the writers make the following statement:—

'The majority of workers who have studied metabolism in the tropics are in agreement with the present writers, viz., that there is no essential difference in the basal heat production in people whether living in the tropics or in the cold or temperate zones'.

Reference to modern work on the subject, however, will not tend to support the writers' contention. Of workers in India the writers have referred to the earlier work of Dr. H. N. Mukherjee (1926), of Colonel Sokhey (1927), and of Drs. Krishnan and Vared (1932), but they do not refer to Dr. H. N. Mukherjee's more recent work with myself (1931, *Indian Journ. Med. Res.*, XVIII, 807) nor to that of Professors Mason and Benedict (1931, *Indian Journ. Med. Res.*, XIX, 75) and of Dr. Banerjee (1931, *Indian Journ. Med. Res.*, XIX, 229).

All of these publications in India show a lower basal metabolism of Indian subjects. Of the publications abroad the writers only refer to five or six papers in their own support, but they do not refer to the large number of recent publications which do not support them.

The writers have referred to the work of Turner (1926) in their support but may I be permitted to draw their attention to Turner's more recent work (Turner and Aboushadid, 1930, *Amer. Journ. Physiol.*, XCII, 189) in which definitely low basal metabolism of Syrian subjects is reported.

I may also mention that the Aub and Dubois' standards are nowadays considered to be about 5.0 per cent too high even for Europeans. So it may appear from Dr. Bose and Mr. De's article that the basal metabolism of their Indian subjects is really 5.0 per cent higher than that of Europeans.

Yours, etc.,
P. C. GUPTA, M.Sc.

BIOCHEMICAL DEPARTMENT,
CARMICHAEL MEDICAL COLLEGE,
CALCUTTA,
8th July, 1935.

[Note.—It is not always necessary, or even possible or advisable, to refer to all the published work on a subject about which one is writing. In this case our contributors were not propounding a theory regarding

basal metabolism in Indians but were reporting their own findings. They state quite clearly that in their experience with Indians the normal basal metabolic rate is about the same as that of healthy Europeans living in temperate climates. From the last paragraph of this letter we gather that even in temperate climates experts differ, but it is not a serious matter if they differ only within the limits of \pm 5 per cent.—EMTON, I. M. G.]

RELIGION AND DISEASE

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Reading through the medical papers from India, one finds that reports on cases usually start as follows:—'A. B., Hindu male', or 'C. D., Mohammedan female, etc.' It would appear from these reports that next to one's name the most important fact was one's religion. Medical contributors, some of them very eminent and entitled to the greatest respect, often refer to their patients as 'Hindu male', 'Mohammedan male', etc., though there is absolutely no necessity for so doing. For instance, in the last number of the *Indian Medical Gazette* the following references occur:—Hindu male (malignant tumour), Hindu male (snake bite), Hindu male (melanoma), Mohammedan, aged 35 (bleeding). In fact, in any of the issues of Indian medical papers one sees the same thing.

I believe India is the only country where its medical men refer to their patients by religion. Do we hear in Europe or America of 'Church of England male' or 'Atheist female'? It would be ridiculous; so is our case in India. No wonder that India is the laughing stock of the world as regards its cleavage into religious sections. We, educated citizens of the country, are helping, instead of ending, this division by giving undue and unnecessary prominence to the religious persuasion of our patients.

If the writers desire to give the nationality of their patients it is only necessary to refer to foreign patients, e.g., Chinese. Otherwise, by inference, it follows that the patient is an Indian. In case, as in reports on metabolic diseases, the religion is given as indicating habits of diet, it is better to say 'A. B., aged 35, vegetarian' as the case may be.

I am sure those who think about it will find how ridiculous the whole thing is and they will be wondering how this habit has persisted so long. Through the columns of your paper I would like to appeal to all medical journalists and contributors, especially Indians, to drop this habit of mentioning their patients' religion in their reports and thus to help in the great cause which should be at the heart of every well-wisher of

India, namely, the abolition of communal feeling, through lessening of its prominence.

Yours, etc.,
A. D. SAGAYAM.

NADI,
FIJI ISLANDS.

[To us this is a new point of view, as we think it will be to many of our readers, but nevertheless we see much sound common sense in our correspondent's argument, and we are very pleased to publish his letter.—EDITOR, I. M. G.]

THE RATE OF DEVELOPMENT OF HOOKWORM EGGS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—With reference to the article on 'The Rate of Development of Hookworm Eggs' by P. A. Mapleston, published in your July number, we wish to record a recent experience of our own with the stool of a patient in our laboratory at Sriniketan.

In ordinary smear we noted eggs containing four or more cells and a few with band-like structures bent at the extremities. We thought the latter were probably eggs of *Strongyloides stercoralis*, but Dr. J. C. Chakravarty disagreed and advised us to collect and examine a larger number of eggs from the stool by a concentration method.

A portion of the stool was mixed with 5 c.cm. of 5 per cent acetic acid and 5 c.cm. of ether added; it was thoroughly mixed and centrifuged. A great deal of the debris floated to the top and in the clear fluid at the bottom of the tube very many eggs were found.

We now found eggs in every stage of development from four cells up to the band-like larva we had noted previously, and from one egg a fully developed larva was partly hatched thus clearly indicating that all the eggs were those of hookworms in different stages of development.

We are thus able to confirm the observations of the writer of the article referred to above.

Yours, etc.,
AMAR NATH GHOSH.

SRINIKETAN CLINICAL LABORATORY,
SRINIKETAN,
SURUL, BIRBHUM,
2nd August, 1935.

[Note.—Unfortunately the writer of this letter omits to state how long the stool was passed before it was examined.—EDITOR, I. M. G.]

TEETH AT BIRTH

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In my practice I have come across the following instance of teeth at birth:—

In 1921, one child	with two lower central incisors.
In 1926, " " "	" " "
In 1934, two children	" " "
In 1935, one child with left	" " incisor.

My experience may be of some medico-legal interest.

Yours, etc.,
A. F. W. DA COSTA, F.R.C.S.E.,
D.T.M., L.M.S., V.D.,
Civil Surgeon.

BULDANA.

EVIPAN-SODIUM

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I think the following sufficiently interesting to report:—

A European, male, aged 23, six feet, weighing over 12-stone, slenderly but athletically built, was suffering from an ischio-rectal abscess. I decided to give him Evipan-Sodium. The Evipan-Sodium was taken from a box of five ampoules, one of which had already been used. The Evipan was mixed as directed with the

distilled water supplied in ampoules and the solution was injected into the median basilic. Before injection was commenced the patient was told to count, which he did at the rate of 60 per minute. Injection was started with the counting, and given approximately, at the prescribed rate. As no signs of anaesthesia were noted the rate of injection was slowed down so that when the patient had counted up to 160, eight cubic centimetres had been given or about 0.8 grammes. As I considered it unwise to go on, the injection was discontinued. The only thing either I or my colleague noticed was dilatation of the pupils, while the only thing the patient noticed was a slight pain in the arm. Not the slightest evidence of anaesthesia could be detected. I may add that the only other ampoule used out of the box was given the previous week to a coolie and he was completely unconscious when two cubic centimetres of the solution had been given.

Yours, etc.,
HUGH FLACK, M.B.

BEESAKOPIE,
DOOM DOOMA,
14th September, 1935.

Service Notes

APPOINTMENTS AND TRANSFERS

COLONEL E. W. C. BRADFIELD, C.I.E., O.B.E., V.H.S., Officiating Surgeon-General with the Government of Bombay, is confirmed in that appointment, with effect from the 14th August, 1935.

Lieutenant-Colonel N. S. Sodhi, M.C., Officiating Inspector-General of Civil Hospitals, Burma, is confirmed in that appointment, with effect from the 12th August, 1935.

Lieutenant-Colonel P. S. Mills, Officiating Inspector-General of Civil Hospitals, Bihar and Orissa, is confirmed in that appointment, with effect from the 21st August, 1935.

On termination of his appointment as Officiating Deputy Director-General, Indian Medical Service, the services of Lieutenant-Colonel F. A. Barker, O.B.E., will be placed at the disposal of the Home Department, with effect from the 24th August, 1935.

Lieutenant-Colonel J. C. De, on return from leave *ex-India*, is appointed as Superintendent of the Campbell Medical School and Hospital, *vice* Lieutenant-Colonel N. C. Kapur, granted leave.

The services of Major G. H. Fitzgerald are placed permanently at the disposal of the Government of the United Provinces, with effect from the 26th June, 1932.

Major W. E. R. Dimond, Assistant Director of Public Health, North-West Frontier Province, is appointed to officiate as Inspector-General of Civil Hospitals and Prisons, North-West Frontier Province, in addition to his own duties, with effect from the 3rd July, 1935 (afternoon), until further orders.

Major W. D. B. Read, an officer of the Medical Research Department, on foreign service under the Indian Research Fund Association, is appointed to officiate as Assistant Director, Central Research Institute, Kasauli, *vice* Captain M. L. Ahuja, granted leave.

The services of Major J. R. Katariya, Superintendent, Presidency Jail, are replaced at the disposal of the Government of India, Army Department, for military duty on the expiry of the leave granted to him under Government notification.

The services of Captain R. D. MacRae are placed temporarily at the disposal of the Chief Commissioner, Coorg, for appointment as Civil Surgeon, Coorg, *vice* Captain Sheridan, I.M.S., granted leave, with effect from the date on which he takes charge of his duties.

Captain D. MacDonald Fraser is appointed to officiate as an Agency Surgeon and is posted as Civil Surgeon, Quetta, with effect from the afternoon of the 13th June, 1935.

The services of Captain M. R. Sinclair, O.B.E., are placed temporarily at the disposal of the Government of the United Provinces, with effect from the 26th June, 1935.

Captain B. S. Sandhu is appointed to act as Superintendent of the Presidency Jail, with effect from the 1st September, 1935, or from the date on which he actually takes over charge, vice Major J. R. Katariya, granted leave.

Captain K. S. Fitch, Civil Surgeon, Midnapore, is appointed as Second Resident Medical Officer, Presidency General Hospital, Calcutta, vice Dr. W. A. Browne.

Captain E. G. Montgomery, Civil Surgeon, Murshidabad, is on relief appointed as Civil Surgeon, Midnapore, vice Captain K. S. Fitch.

The probationary appointments of the under-mentioned officers are confirmed:—

Captains

1. W. J. Virgin (Tor).
2. J. Brebner.
3. H. W. G. Stannton
4. J. D. Gray.
5. D. W. Taylor.
6. P. H. Addison.
7. J. W. D. Goddall.
8. F. J. Doherty.
9. S. G. O'Neill
10. C. B. Miller.
11. M. G. Leane.
12. G. E. S. Stewart.
13. D. P. Dewe.

The following appointments are made:—

Temporary Commission (I. M. S.). To be Lieutenant
Abdul Aziz Khan, dated 12th June, 1935.

To be Lieutenants (on probation)

24th June, 1935

Coleman Kevin Byrnes (seconded).

Raymond Joseph Henderson.

John Revans (seconded).

Charles Walter Alban Searle, 26th June, 1935.

LEAVE

Colonel C. I. Brierley, C.I.E., Inspector-General of Civil Hospitals and Prisons, North-West Frontier Province, is granted leave for 7 months and 29 days, with effect from the 3rd July, 1935 (afternoon), preparatory to retirement.

Lieutenant-Colonel F. J. Anderson, Professor of Clinical Surgery, Medical College, Calcutta, is granted leave for 5 months, with effect from the 24th May, 1935.

Previous notification is hereby cancelled.

Lieutenant-Colonel N. C. Kapur, Superintendent, Campbell Medical School and Hospital, Calcutta, is granted leave for 1 year, with effect from the 4th September, 1935, or from the date of relief.

Lieutenant-Colonel R. V. Martin, Superintendent, Yeravda Central Prison, is granted leave for 4 months and 12 days, from the 9th November, 1935, or the date of relief.

Major J. R. Katariya, Superintendent, Presidency Jail, is allowed leave for 2 months and 17 days, with effect from the 1st September, 1935, or any subsequent date on which he may be relieved.

Captain A. M. Sheridan, Civil Surgeon, Coorg, is granted leave for 2 months and 25 days, combined with furlough, out of India, for 3 months and 5 days and study leave for 6 months, with effect from the 1st September, 1935, or any subsequent date of availing.

Captain M. L. Ahuja, Officiating Assistant Director, Central Research Institute, Kasauli, is granted leave for 1 year, with effect from the 1st September, 1935, or any subsequent date on which he may avail himself of it.

PROMOTIONS

Major to be Lieutenant-Colonel

R. A. Warters. Dated the 12th July, 1935.

Captains to be Majors (provisional)

Dated 8th July, 1935

G. P. E. Bowers.

J. S. Riddle.

J. E. Gray.

Dated 24th July, 1935

S. Smythe.

Dated 27th July, 1935

M. H. Wace.

Lieutenant to be Captain

P. W. Whiteman. Dated 27th June, 1934, with seniority from 1st May, 1934.

Lieutenant (on probation) to be Captain (on probation)

G. P. Charlewood. Dated 27th May, 1935, with seniority from 17th December, 1934.

RETIREMENTS

Colonel H. E. Stanger-Leathes, R.A.S. Dated 6th August, 1935.

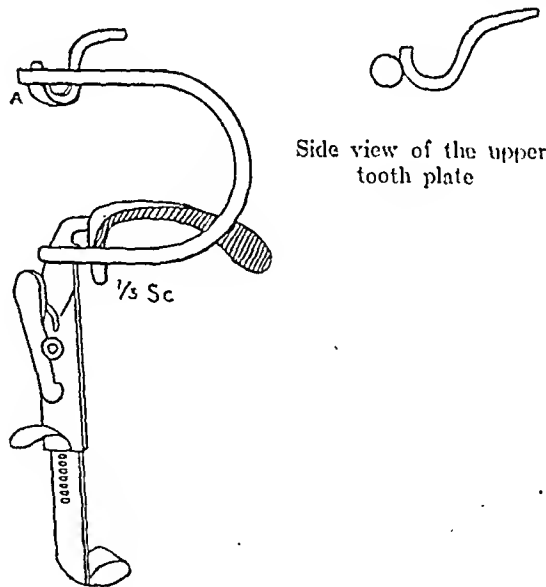
Lieutenant-Colonel K. G. Gharpurey. Dated 28th July, 1935.

Notes

THE BOYLE-DAVIS GAG

By V. S. HARIHARAN, M.B., F.R.C.S. (Eng.)

The Boyle-Davis gag used in operations on the oropharynx, such as tonsillectomy, consists mainly of a fixed gag with a movable and replaceable tongue depressor below and a tooth plate above. This upper tooth plate consists of two flattened hooks into which sit the upper row of teeth; so much so when the gag is in action and the mouth is opened wide the upper tooth plate takes pressure from the upper row of teeth. These flattened hooks are small and shallow, and do not fit properly in all cases, with the result that the gag often slips at a critical moment and a great deal of anxiety to the surgeon is caused. To avoid this slipping of the gag Messrs. Down Brothers, London,



have been kind enough to make for me according to my specification the following modification in the gag as in the figure.

The two hooks of the upper tooth plate are replaced by a single one centrally placed half an inch broad and an inch and a half long and curved up so as to take pressure from the hard palate and not from the upper row of teeth as is ordinarily the case. This keeps the

gag steady and there is very little chance of its slipping, nor does it produce any abrasion of the hard palate at the site of the pressure, because of the smooth curve given to the plate.

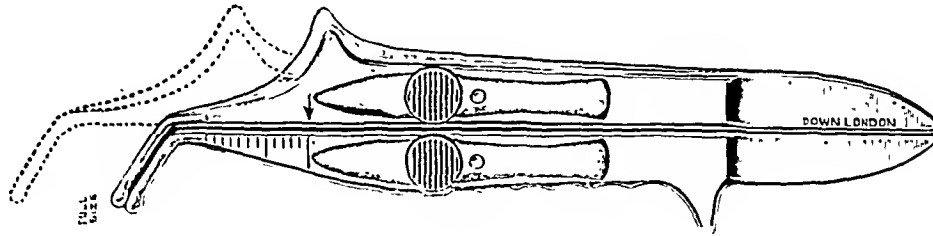
I have done a number of operations with this modified gag and have not had any single case where the gag has slipped. I believe the surgeon can have more confidence in this modified gag than in the original one.

TWIN FORCEPS

By A. WYNN GREEN

TWIN forceps to be used in the resection or resection advancement operation on the internal rectus in order to avoid the employment of calipers and rulers have been made for me by Messrs. Down Brothers, Limited.

These forceps are really two Prince's forceps united together in such a way that one slides on the other and is readily detachable.



Twin forceps.

The forceps have a ten millimetre scale, D, by which can be made an exact measurement of the length of muscle to be removed. They are applied in the manner of ordinary Prince's forceps—both forceps being clipped to the muscle. The upper forceps B is then opened, and moved down the scale. The muscle is now secured between the jaws of forceps B; when the muscle between A and B has been cut away, forceps A is removed, and the operation is completed in the usual way.

ARE CHILDREN CORRECTLY FED?

NEW LIGHT ON GROWTH OF CHILDREN IN SUMMER

SPEAKING at the Annual General Meeting of Virol Limited, Mr. A. E. Canney, Managing Director, said that considerable discussion had recently taken place in the medical press on the subject of malnutrition during the age of growth. He pointed out that *malnutrition* in this respect was, perhaps, an unfortunate word, since the layman understood it to arise from insufficiency of the total quantity of food consumed, whereas all the evidence indicated that the main factor was lack of balance in the diet.

It had been suggested that this lack of balance could be corrected by administering concentrated preparations of vitamins; but recent experiments had shown that this procedure gave no beneficial results. The correct method of attacking the problem of malnutrition was shown by the results of important investigations published in *The Medical Officer*, 30th March and 6th April, 1935.

RECENT CONFIRMATION OF THE VALUE OF VIROL

In these investigations a number of children, all receiving an ordinary home diet, were divided into four groups. One group was given no special treatment, and the other three received respectively cod-liver oil, halibut-liver oil, or Virol. Those receiving halibut-liver oil were also given sufficient milk to provide calories equivalent to the other supplements.

The groups were interchanged at intervals in such a way that at the end of the experiment each child had been on every treatment in turn. It was thus possible to compare the effects of the supplements on the growth-rate of children in a scientific test which eliminated individual differences in the children themselves.

In the result, it was found that cod-liver oil, and halibut-liver oil with milk, each showed some improvement, but not up to standard. In sharp contrast, the

growth-rate produced by Virol was not merely better than that of the other supplements, but actually attained the figure usually accepted as ideal. This was direct proof that Virol was in itself adequate to restore normal growth and health to malnourished children. This implied that the deficiencies of their ordinary diet had been completely restored—a result extremely difficult for parents to achieve in any other way.

VIROL TO REPLACE EXTRA WASTE OF ENERGY IN SUMMER

A further point arising out of the investigation referred to was the influence of the summer period on the children's growth-rate. During this period all the children lost weight, with the exception of those receiving Virol. The advent of summer time and long hours of daylight implied on the one hand a loss of sleep and appetite, and on the other hand, greatly increased opportunity for exercise and expenditure of energy generally. It was obvious that loss in weight

must occur unless steps were taken to counterbalance this expenditure. The significant point was that the other supplements accomplished nothing in this direction, whereas the use of Virol resulted in the children's weight being maintained.

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Original Articles

THE DISORDERS OF DIGESTION

THE COMMONER DIGESTIVE DISORDERS OF CHILDREN IN INDIA

By E. H. VERE HODGE, M.D. (Cantab.),
M.R.C.P. (Lond.)

LIEUTENANT-COLONEL, I.M.S.

Professor of Medicine, First Physician, Medical College
Hospital, Calcutta

PREFACE

Few infants pass the whole of their infancy without some mild attack of abdominal pain of a transient character. This pain is known as colic and is caused by spasm of the intestine or the accumulation of wind. The cause is usually a mild indigestion due to errors or excess of food, hasty feeding, or, in the case of breast-fed infants, some indiscretion on the part of the mother, which has rendered the milk indigestible. Simple colic is of short duration and easily amenable to treatment. No purgative, such as castor oil, should be given while there is pain. Should severe pain persist for more than an hour in spite of appropriate treatment, the development of organic disease within the abdomen must be suspected.

Treatment.—Gentle massage of the abdomen followed by hot applications—a carminative mixture such as the following: Sodium bicarbonate 2 grains, aromatic spirits of ammonia 2 minims, spirits of chloroform one minim, and peppermint water to one drachm.

When there is much wind and the abdomen is full, a number 8 catheter, well-lubricated, may be passed for an inch up the rectum and left in position for half an hour or so.

When the urgent symptoms have subsided we must consider the cause; if there is constipation we give a rectal washout followed by one teaspoonful of castor oil, for a child of one year; if there are signs such as vomiting or undigested particles in the stools we cut down and adjust the diet to the standard diet for the infant's. In the case of breast-fed infants the administration of water before the feeds may improve the digestion.

During infancy and childhood the digestive tract is not attuned to the strain constantly thrown upon it by injudicious feeding and other hygienic faults, so that we commonly find, in the occurrence of digestive disturbances, evidence that our management is not all that it should be.

General considerations

The commonest disorders are:—(1) Constipation, (2) Diarrhoea, (3) Dyspepsia (infantile intestinal dyspepsia).

CONSTIPATION

This is particularly prevalent in India and is in all probability to some extent to be traced to the poor mineral content of the food, together with the want of an invigorating quality in the climate, excessive loss of fluid through the skin, lack of roughage, lack of fat, lack of vitamins, and general inertia. The symptoms associated with chronic constipation are many; they are:—

Appearance—complexion sallow, dark rings under the eyes, a brownish staining of the skin folds, particularly in the arm-pits and in the groin, abdomen prominent, breath apt to be foul, and tongue coated.

Nervous system—irritability, restlessness and sleeplessness or marked restlessness during sleep with tendency to night starts.

Other symptoms—irregular temperature at times, lack of energy, occasional attacks of colic or vomiting, and capricious appetite. Not infrequently a few drops of blood may be passed at the end of a hard stool, owing to the rupture of a small vein. Such an accident need not cause alarm.

Regularity in the daily passage of stools may be misleading. There may be an incomplete clearance of the bowel; some of the faeces is passed while the remainder accumulates in the bowel, a process known as hoarding. When this is suspected a bowel wash may be given and the result may reveal that a large quantity of faeces has accumulated within the bowel. Further, stools may be passed regularly but still be delayed; the stool passed should have passed twenty-four hours earlier. This may be suspected when the stools are hard, dark and streaked with brownish-mucus are attached to them. The general condition of the child will also rouse this suspicion.

In infants at the breast, constipation is common, especially during the first two months of life. The child is otherwise in good health, but the motions are infrequent and hard. It is at this time important to take steps to correct this condition, lest habit be established. The mother by correcting her diet, eating more fruit and vegetables and taking plenty of water, may bring about a natural cure, but it is useless for her to take laxatives with the vague idea that these may affect the child. The amount of food taken by the child must be checked by weighing the child before and after feeds as the constipation may be due to insufficient food or even lack of water. One teaspoonful of milk of magnesia added to the bottle is an excellent corrective and in addition a teaspoonful of liquid paraffin may be given daily.

In all cases of obstinate constipation dating from birth, and particularly in those cases where there is much straining at stool, examination should be made of the anus to exclude one condition, spasm of the sphincter, which is not an uncommon cause of early constipation and which, if uncorrected, will lead to considerable

trouble later. The little finger well covered with vaseline is gently introduced. Where there is spasm, considerable resistance will be felt, which must not be overcome by undue force but by gentle pressure maintained until the resistance is felt to give way. This process is repeated daily for a week. Some cases of this nature are of an extreme type, the abdomen becomes distended, the child is blue from pressure of the distended bowel on the lungs, and is constantly screaming, particularly after the meals, when the pressure within the abdomen is further raised. Relief may be given immediately by the simple manoeuvre described above, followed by a small olive-oil enema.

In dealing with constipation in bottle-fed babies, the first step will be to revise the food, to ensure that the quantity is sufficient, that the amount of fluid is sufficient, and that the constituents are in correct proportion. The fault is likely to lie in high proteid with low fat and carbohydrate; we may therefore dilute our milk and add a little extra fat in the form of top-milk, artificial cream, or a teaspoonful of cod-liver oil to two or three bottles, and increase carbohydrate in the form of milk sugar or Mellin's food. Failing this we may employ milk of magnesia. The prolonged use of suppositories or enemata is not to be encouraged.

After the age of six months, constipation may be more obstinate and stronger laxatives may be required. In such cases we must carefully examine the abdomen for signs of any marked dilatation of the colon, as in the event of such signs being present, treatment by laxatives and dieting must be supplemented by massage and oil or saline enemata. In simple cases, as a laxative, we may use five drops of liquid extract of cascara combined with 30 drops of syrup of figs, to which may be added one drop of tincture of podophyllin if the stools are putty-like.

For older children it must be distinctly understood that the only merit in laxatives or purgatives is that they are given with the one idea of setting up a regular habit; if need be, they may be continued for a month, until the tone of the bowel is restored and a habit established. A child should be taught to go to the closet regularly at a fixed time daily and this routine, if persisted in, will be of life-long benefit. There are many useful laxatives for this purpose, e.g., aromatic extract of cascara ($\mathfrak{m} x$), liquid extract of liquorice ($\mathfrak{m} x$), and syrup of figs (3i or more).

The writer has found the following prescription effective :—

℞
 Extracti cascarae aromatici .. \mathfrak{m} 15
 Syrupi ficorum \mathfrak{m} 45
 Paraffini liquidi 3i
 Decoctum chondri crispi ad 3ii

Two to four teaspoonfuls according to age.

A useful home remedy for constipation is the following :—

℞

1 pound of French plums,
 1 pound of Demerara sugar,
 1½ ounces of pounded senna,
 ½ ounce of ground ginger.

Stew the plums in a little water until tender, remove the stones, then add the rest, mix, and beat into a paste.

Give one teaspoonful at night for a child of four.

The subject of constipation has been discussed at length partly because of its importance later to the child's welfare and partly because of its frequency in this country, but, before concluding, it is necessary to remember that laxatives are but a small portion of the treatment. A regular habit must be aided by a regular and proper diet. In the tropics, fluid readily leaves the body by the sweat glands. The child therefore should drink copiously and, when he so desires, between meals; the diet should be simple with the avoidance of seasoned or hot dishes, pastry and sweets should be allowed only in moderation, and fruit and vegetables should be taken freely. Oranges and papaya are usually readily procurable at any time and may be given.

In our experience, those cases which are sufficiently severe to be brought to a doctor are never cured by a so-called 'suitable diet' alone; there is always some fault, either in the intestinal musculature or the secretory function of the bowels, which needs correction. Indeed, some of these cases complicated by wasting and lack of appetite abundantly prove the recent researches on the importance of the endocrine glands, for we have seen cases persisting despite drug, diet and massage treatment, which have rapidly been cured by giving small doses of thyroid extract.

In this country, a not uncommon type of constipation met with is that following dysentery. We think these cases are best treated by the lubricant, liquid paraffin in teaspoonful doses, and, if this fails, 5 to 10 drops of the cascara evacuant, or other preparation of this nature, may be added to the paraffin.

ACUTE DIARRHOEA

In all forms of ill health in childhood, whether primarily in connection with the digestive tract or not, the earliest reaction is apt to be diarrhoea. The disorder shows the widest variations in gravity, from the simple acute attack due to overfeeding or chill to the most severe forms which endanger life. All cases, however, must be treated promptly and the cause sought.

The main causes are errors of diet whether habitual or single, climatic conditions, contamination or infection of food, and dysentery, or the condition may be incidental to acute illness.

Classification

1. Simple, dietetic or climatic.—Failure to regulate the diet according to climatic conditions is responsible for most cases. In some cases all the elements of the diet may be in excess, but more commonly the fat or carbohydrate is in excess, or there may be irregularity in feeding with sweets or biscuits between meals. The onset of digestive derangement in children is characteristically sudden. This is often misleading as the mother will attribute it to some immediate cause, such as a feed of soured milk, whereas careful scrutiny will reveal the fact that the child has not been well for some time, that is to say, the digestion has been failing gradually and the onset of the diarrhoea possibly with vomiting is merely the culmination.

2. Catarrhal diarrhoea.—In this condition there is an actual superficial inflammation of some part or the whole of the alimentary tract, which may be secondary to the simple form, but is more commonly produced by bacterial contamination of the food. This group tends to be severe and resistant to treatment, and includes such conditions as that usually known in Great Britain as summer diarrhoea (acute diarrhoea and vomiting of infants), and the acute fulminating form of white diarrhoea known as cholera infantum.

3. Infective diarrhoea.—A condition caused by the infection of the bowel with certain specific organisms.

4. Dysentery.

5. Parenteral diarrhoea.—The diarrhoea which sometimes accompanies generalized diseases or acute disease outside the alimentary tract, e.g., at the onset of measles, during pneumonia, or with acute disease of the ear.

SIMPLE OR DYSEPTIC DIARRHOEA

This form does not as a rule present very serious symptoms. The child has no appetite, the stools are frequent, green and sometimes frothy with excess of liquid and are apt to be passed explosively. Sometimes there is vomiting and often there is fever, though not of a high degree. When the fat has been much in excess the stools will be very pale and greasy looking. With excess of starch, the abdomen is distended, the stools are frothy and there is much passage of wind. Diarrhoea due to proteid indigestion is less common; here the stool is greenish or brown surrounding tough yellowish lumps of curd. The stools of the first two varieties tend to be acid and this acidity combined with the frequency leads to a reddening and soreness round the anus.

CATARRHAL OR INFECTIVE DIARRHOEA

In the more severe types with persistent vomiting, the stools are excessively frequent and brownish at first. Very soon the stools contain little solid matter and consist mainly of a greenish fluid with abundant mucus and often

with streaks of blood. The child suffers from pain and there is crying and straining before and after the stool. In addition, the constitutional symptoms grow rapidly more severe, and are attributable to two causes, the toxæmia of bacterial contamination and dehydration, that is, the excessive drainage of fluid from the tissues. The child appears shrunk, the face is pinched, the eyes sunken, and a greyish coloration appears round the mouth. In young infants the fontanelle may be felt to be depressed. The hands and feet become cold and bluish. There is marked restlessness and lack of sleep from constant pain or discomfort, and the cry becomes enfeebled to a mere moaning. At the inception the temperature will be high, even as much as 105° to 106°F. , but as collapse sets in the temperature drops and may become dangerously low. Sometimes the surface temperature is subnormal while the temperature taken in the rectum is high. Nervous symptoms, twitchings, convulsions, loss of consciousness, and retraction of the head are prominent. One peculiar and serious sign is seen in the later stages, that is the eyes become markedly congested, with profuse lachrymation. The urine is diminished or may be entirely suppressed.

In the most severe type, known as cholera infantum, the stools are white resembling rice-water, and constantly drain away. Vomiting is severe and the progress of the disease is appalling in its rapidity.

TREATMENT

Mild cases—simple diarrhoea.—All food is stopped for twelve hours or more, but water is given freely, if necessary sweetened with a little saccharin. The first feeds are of whey or albumin water in amounts half the size of the usual feed according to age and given somewhat frequently, say at intervals of $2\frac{1}{2}$ hours. A mild laxative is indicated if there is much undigested matter in the stools, castor oil is safe but apt to cause vomiting, so that a mixture of sodium sulphate—grs. 10, sodium citrate—grs. 5, syrup—minims 10, and water to 2 drachms, is preferable and may be given two-hourly to three or four doses according to the response. If there is much watery purgation, 'Colloidal' kaolin—grs. 10 may be added to each dose. If there is much mucus or frequent small stools containing undigested matter and disturbing the child, a bowel wash of normal saline may be given.

In all cases of diarrhoea, the stools should be carefully examined for traces of yellowish pus, which is an indication of infection of the dysenteric type.

Later, additions to the feed should be made with caution; skimmed milk replaces the whey by degrees and Mellin's food is added. The normal diet is reached by stages according to the tolerance of the child. When the attacks have been severe and the digestive capacity accordingly impaired, the early milk feeds may

with advantage be acidified. Before the child is permitted to return to full diet, the original diet must be scrutinized for errors.

In treating the more severe forms the greatest promptitude is required. There must be no delay as the secret of success lies in limiting the gravity of the disease.

The essential indications, in the order in which they demand attention, are:—

1. To replace early the lost fluid and so prevent a serious degree of dehydration.

2. To control the vomiting so that fluid may be taken by mouth.

3. To get rid of the poison within the bowel (bacteria, toxins, or poisonous food products) and to counteract the toxæmia.

4. To ensure rest and prevent convulsions.

5. Stimulation.

Water may be given by the mouth in a bottle practically continuously if the child will suck, otherwise in a teaspoon. Where there is vomiting, if water cannot be retained then we must have recourse to other methods. It is useless to give rectal saline as it is constantly rejected. It therefore remains to give normal saline fluid under the skin, four ounces being injected slowly by the gravity method every six hours or, when skilled assistance is available, by the intravenous route.

Vomiting may be treated by washing out the stomach with two grains to the ounce of sodium bicarbonate. When the fluid returns clear a further small quantity is run in and left there. The process is exceedingly simple. If the child will swallow, the same effect is attained by giving sodium bicarbonate drinks which will be vomited and so wash out the stomach. Other measures are as follows:—

(a) Fractional doses of calomel—grain 1/12th with milk sugar every half hour up to a total of three powders, or

(b) Atropine sulphate injection—grains 1/1000th to 1/400th, according to the age of the child, repeated four-hourly.

(c) Mustard plaster, of appropriate strength, to epigastrium.—

The following saline mixture can be given every hour, the interval being lengthened as the case progresses:—

R			
Sodii sulphatis	..	..	grs. x
Sodii bicarbonatis	..	..	grs. v
Glycerini	..	..	℥ xv
Aquam	..	..	ad 5i

A certain judgment should be used in administering salines, and, if the purgation has already been excessive, it is wiser to add small doses of kaolin—grs. 10, or bismuth carbonate—grs. 5 to the mixture to moderate the flow, but not to stop it entirely and thereby lock up the toxins in the bowel.

The child is constantly disturbed by pain, discomfort and the passage of motions. This

will result in exhaustion to the nervous system and a tendency to convulsions. Accordingly, as soon as the most acute symptoms have passed, it is advisable to give a sedative mixture as follows:—

R			
Phenazone	..	..	gr. ½
Potassii bromidi	..	..	gr. i
Syrupi	..	..	℥ xv
Aquam	..	..	ad 5i

Repeat in two hours if necessary, otherwise give four-hourly.

Stimulants may be necessary, the best being brandy, five drops in a teaspoonful of water every three hours. In case of urgency we may inject adrenalin—minims 1 to 3, according to age, and repeat four-hourly.

As soon as the acute stage is over, we must consider the question of feeding. There has been a great loss of protein, carbohydrate and mineral salts, all of which we must replace at the earliest possible moment, bearing in mind the digestive tolerance. For protein, we begin with whey, and for carbohydrate one of the best foods is raisin tea, made by adding one tablespoonful of chopped raisins—(kismis) to a pint of boiling water, cooling and straining; of this one ounce may be given every hour. The feeds should at first be kept small, one to two ounces and given every hour or two hours. Calcium lactate—grs. 2 may be added to three feeds daily.

Further advances are made with extreme caution. The whey is gradually replaced by skimmed milk, or, as an additional precaution, we may peptonize the skimmed milk. A little later we may add Mellin's food and gradually reduce the time of peptonizing the milk. In early convalescence, acidified milk will be found suitable. The return to the normal diet must be gradual.

Drugs, beyond those mentioned above, have no place in the treatment of this condition, and particularly must caution be used in regard to the use of astringents. If used at the wrong moment, they will cause distension and fever, due to the accumulation of intestinal intoxication products. They must be used only when there is evidence that there is a persistent over-activity of the intestinal musculature after inflammation or irritation from undigested food has subsided.

There are certain other complications which require attention.

1. Hyperpyrexia (temperature over 104°F.):—Ice-bag near the head and tepid sponging.

2. Collapse, with coldness of hands and feet and subnormal temperature:—Hot mustard bath, or, better, electric radiant heat, hot-water bottles, brandy by the mouth—five drops two-hourly in one teaspoonful of water, if the child does not swallow rub the gums with undiluted brandy, adrenalin—℥ 2 hourly to four-hourly

or tincture of ephedra— η x-xv six-hourly, and finally subcutaneous saline.

3. Irritation round the anus and in the rectum:—The external irritation of the skin round the anus may be prevented by washing with a dilute solution of sodium bicarbonate, a teaspoonful to a pint of water, and smearing the parts with vaseline, or by an application of zinc oxide—grs. 20 added to an ounce of castor oil. This application is renewed every time the bowels are opened.

For internal irritation, the washing out of the bowel in the early stages has its uses, especially if there is an accumulation of undigested food in the rectum or few motions with much straining, but in the advanced stages of the more acute type it is of little value and even harmful, as the mucus which is formed acts to some extent as a protection.

Threatened convulsions, that is to say, twitching of the hands and rolling of the eyes, may be averted by the timely administration of brandy, or the bromide mixture.

Opium must never be given at the onset of diarrhoea as it will prevent the evacuation of the irritating material. It may sometimes be used during convalescence when the bowel is in a state of hyperactivity, and the food is hurried on without digestion. In such cases a mixture such as the following is advised, for a child of one year old:—

R
Bismuthi carbonatis .. grs. v
Tincturæ camphoris compositæ η ii
Tincturæ belladonnæ .. η jss
Gummi acaciæ .. q. s.
Aquam .. ad 5i
ter in die

Convalescence.—After an attack of severe diarrhoea of any form, the child's general health is much reduced and steps must be taken forthwith to restore it. The digestion is impaired and feeding must be guarded with the greatest caution. There is a particular tendency to obstinate constipation which must be met by suitable aperients, cream of magnesia and liquid paraffin being the best, and by general tonics. There is also often serious anæmia which in more grave cases may be adequately dealt with by the use of liver extract. Iron should also be given in an easily digestible form such as the following prescription:—

R
Syrupi ferri iodidi .. η xx
Extracti malti .. 5 ii
bis in die—post cibum

This, however, must not be given so long as there is any diarrhoea, or until the constipation has been corrected. An excellent remedy is a soup made of liver and spinach, given three times a week. Fresh fruit is introduced early

and the fat-soluble vitamins are replaced by giving Radiostoleum or Adexolin as soon as the digestion will tolerate it. When possible a change of air to the seaside or the hills according to season should be given.

CHRONIC DIARRHOEA

Chronic diarrhoea is a disease which may start in a number of ways; it may follow an acute attack, as the result of ill adjustment of the diet; it may be due to the persistence of an infection, usually of the dysentery group, or to the presence of worms; it may be due to a persistent error in the diet or to intolerance on the part of the child to some article of diet even though given in what to other children would be a correct amount. Further, the diarrhoea may be part of some constitutional disease such as rickets. The disease may start early in life and is more common in artificially-fed infants.

The diarrhoea is not necessarily constant, periods of quiescence, even with constipation, occur. The importance of the condition lies in its effect on the general nutrition of the child. He becomes pale and languid, there is wasting and anæmia, there is also naturally a decreased resistance to other infections, so that the child easily falls a victim to any infectious disease.

Treatment.—This is in the first place dietetic according to the nature of the stools. At the outset the stools should be examined for evidence of worms or of chronic dysenteric infection, either amœbic or bacillary.

When due to carbohydrate indigestion the abdomen is distended, the stools pale-coloured and frothy. When due to fat indigestion, the stools are greasy, white and bulky with intervals during which hard white stools are passed. The condition may be due to faulty digestion of all food factors. We should as far as possible identify the offending factor, as during the stage of building up this factor must be added to the diet with the greatest caution.

Treatment is undertaken in two stages; the first is the stage of rest to the bowel and recovery, and the second, the stage of restoring the impaired nutrition. It is clearly useless to attempt the second stage till the first stage is completed and the digestive functions have to some extent been re-established. Relapse often occurs owing to premature attempts to increase the patient's weight or to the administration of tonics, such as cod-liver oil, before the digestion can tolerate them.

During the first stage the child is kept quiet, free from excitement and with prolonged resting hours. The diet is mainly of whey or peptonized skimmed milk, to which Mellin's food may be given if there is no distension. Clear soup may be given to lend variety and stimulate the appetite, but it has very little food value.

Medicinal.—Start with a mild saline-aperient if there is much undigested food in the stools;

TABLE
Showing the distinction between the acute forms of diarrhoea

I SIMPLE	II CATARRHAL	III INFECTIVE	IV DYSENTERY
<p>Cause— Errors of diet. Excess of food. Climate.</p> <p>Onset— Usually preceded by signs of lack of appetite.</p> <p>Main symptoms— Vomiting early but not persistent, stools frequent, character according to error in feeding.</p> <p><i>Excess of fat</i> Early—greasy. Later—whitish. Greenish, watery with white flecks of fat and mucus, acid in reaction.</p> <p><i>Excess of starchy food</i> Stools—frothy, greyish, much flatus, distension of abdomen, later green stools, acid.</p> <p><i>Excess of protein</i> Stools—greenish with tough lumps, yellowish-white, alkaline. In general, mucus not excessive, no blood, 2 to 20 in number, fever slight, respond easily to starvation.</p>	<p>Arising from simple or 'summer' diarrhoea, from 'turned' or contaminated milk.</p> <p>Sudden.</p> <p>All degrees of severity. Vomiting may be severe and persistent. Stools green, mucus abundant. Blood in severe cases. Constitutional symptoms more marked. Fever constant, sometimes high. Tongue dry and dehydration rapid.</p> <p>Stools 2 to 20 in number.</p> <p>Resistant to treatment.</p> <p>Cholera infantum: a very severe form with intractable vomiting, white stools, early collapse, subnormal temperature.</p>	<p>Contaminated food. Specific infection.</p> <p>Sudden.</p> <p>Acute diarrhoea and vomiting with early collapse. Fever often high falling as collapse sets in. Nervous symptoms marked, convulsions or coma. Tongue dry. Dehydration rapid.</p> <p>Stools 2 to 20 in number.</p> <p>Response to treatment not very satisfactory.</p>	<p>Specific infection.</p> <p>Sudden.</p> <p>Stools contain no faecal matter, much mucus, stained red or pure blood. Characteristic spots of yellowish pus. Odour sour and fishy. Gripping severe.</p> <p>Stools 10 to 80 in number.</p> <p>Early collapse. Fever usual, rapid wasting and dehydration. Exhaustion from sleeplessness. Lung complications common.</p>

Group III tends to merge into group IV. In group III the preponderating appearance of the stools is greenish with much mucus and sometimes blood, but close examination will reveal spots of pus, which may become predominant.

follow this by a powder for a child of a year old, given twice daily for three days:—

R
Magnesii carbonatis .. grs. ii
Tincturæ nucis vomici .. ℥ i
Infusi rhei .. ℥ xx
Infusum gentianæ compositum .. ad 5i

After this the following mixture is given, three times a day before food:—

R
Pulveris hydrargyri cum cretæ .. gr. ¼
Pulveris rhei compositi .. grs. 1½
bis in die

In some cases, owing to persistent overaction of the muscle of the bowel, the diarrhoea will not settle down, in spite of adequate dietetic treatment. In one type, lenteric diarrhoea, the introduction of food into the stomach induces an outburst of activity throughout the intestine, so that each meal is followed by an urgent stool. In

such cases sedatives to the bowel are required and the mixture recommended for the same condition after acute diarrhoea may be given.

During the second stage, or stage of building up, gradual additions to the diet are made, the effect being carefully watched. The chief signs of improvement are the return of the appetite, and the improvement in the colour and consistency of the stools. Constipation may even develop through paucity of roughage in the food and this is a sign for increasing this food constituent.

The first addition is of carbohydrates, preferably in the form of Mellin's food, later unmalted cereals, such as Robinson's patent barley, well-boiled rice or some breakfast food may be added. If there is persistent evidence of carbohydrate indigestion and a tendency to distension, Takadiastase—one tablet—may be given with each meal. Easily fermentable articles, such as potatoes, sweet biscuits and pastry, are to be avoided. Fats, either in the form of full cream

milk, butter or articles fried in fat, are added with great caution, particularly in the hot weather when the fat tolerance is at its lowest. Articles which are liable to irritate the intestine mechanically, such as pips and seeds, are rigidly avoided.

Other measures, the provision for adequate rest, fresh air, sunshine and the prevention of chill, are taken. Finally, once the digestion is functioning, iron tonics and vitamins, as in the convalescent stage of acute diarrhoea, are prescribed.

One form of chronic diarrhoea, happily very rare in this country, must be mentioned. This is celiac disease which is characterized by wasting to an extreme degree of emaciation, stunted growth, a markedly-distended abdomen and the passage of large white stools, over prolonged periods. The treatment of this condition is in its essentials the exclusion of all varieties of food except protein, until the stools regain their normal colour.

DYSENTERY

Bacillary dysentery is a common disease in India and affects children with frequency and severity. Amebic infection, though exceedingly common, rarely takes the form of a typical dysentery in childhood.

Bacillary dysentery may be divided into two groups, the dysenteries proper, due to infection of the bacillus of Shiga or of Flexner, and the para-dysenteries, due to infection with other organisms. The distinction between the infective forms of diarrhoea and the para-dysenteric group is artificial, as the same organisms cause acute infective diarrhoea with green stools and severe toxæmia at one time, and at another diarrhoea of the dysenteric type with pus in the stools. The microscopic examination of almost all stools of the infective type will reveal pus cells, though pus may not be apparent to the naked eye. It is characteristic of all forms of bacillary dysentery that the digestive functions are suspended from the outset, so that for the first few hours the case may suggest acute dyspeptic diarrhoea. It is quite possible that these bacteria which we associate with acute diarrhoea and vomiting may become pathogenic in the presence of dyspepsia which will result in a change of their environment.

True dysentery.—The infection by the bacillus of Shiga is the most severe one on account of the associated intense toxæmia. Occasionally the onset is exceedingly abrupt with high fever, vomiting and diarrhoea and early collapse of such severity as to rouse the suspicion that the case is one of cholera, and to require early intravenous transfusion of saline solution to counteract the severe and sudden dehydration. The Flexner type is more common but usually less severe, with less toxæmia and general constitutional disorder.

Symptoms common to both forms.—Onset sudden with pain and griping; frequent loose motions which are at first brown and watery and later assume a characteristic form, i.e., they are small and are passed with straining, contain no faecal matter, have a fishy odour quite different from that of the normal stool, and are of great frequency, sometimes as many as 80 a day. In the milder cases they consist of mucus tinged pink, but in the more severe cases they consist almost entirely of pus with shreds of membrane; occasionally pure blood is passed.

General symptoms.—The abdomen is tender to the touch, there is marked restlessness and exhaustion from sleeplessness due to the constant straining at stool, the temperature is as a rule raised, and there is a rapid pulse. Owing to the number of stools there is a tendency to dehydration. The appetite is at first lost but later is apt to be ravenous. In the milder cases the disease runs a course resembling a severe diarrhoea, often with green stools and much mucus, and only close inspection of the stool will reveal spots or flakes of pus. Convalescence is slow on account of the severe impairment to digestion and there is a tendency for the persistence of a lack of tone in the bowel and frequent constipation.

Treatment.—This may be divided under four headings:—

(1) *Specific treatment.* Antidysenteric serum is divalent, that is to say, effective both against Shiga and Flexner infections. It is advisable, therefore, once we have established the diagnosis of severe dysentery, to wait no longer for laboratory confirmation, but to administer the serum. Dosage—5 to 10 c.cm. to a child one year old, repeated after twelve hours, if necessary. The serum must be given within the first forty-eight hours of the disease, otherwise serious harm may ensue. Of recent years bacteriophage has been introduced which has been of the greatest value. In the more severe cases one ampoule should be given every two hours, preceded by water containing a small pinch of sodium bicarbonate, till five have been given in the twenty-four hours. During the bacteriophage treatment food should as far as possible be withheld, or, at the least, the bacteriophage be given on an empty stomach.

(2) *Relief of discomfort and sleeplessness.* While it is undesirable to give astringents which will lock up the toxic materials, we may with advantage control the excessive activity of the bowel, with the colic and straining, by the administration of belladonna. We may further induce quietness and sleep by giving bromides. Opiates in any form should not be given. Further, so long as the bowels are opened freely, we may give small doses of bismuth which will have a soothing effect and form to some degree a protective covering to the ulcerated surfaces.

(3) Drainage. In order to induce a free watery flow from the bowel, magnesium sulphate in doses of 20 grains to one drachm, according to the age of the child, dissolved in water, is given two-hourly daily until a free flow is insured.

(4) Prevention of dehydration. Water must be given freely. As in the majority of cases there is no vomiting, this is a matter of no great difficulty though in the acute fulminating Shiga type it may be necessary to give intravenous saline.

Diet

The patient is best kept on water only, for the first twenty-four hours at least. After this the diet will depend upon the type of infection. For the Shiga type, as the organism flourishes best on albuminous media, the feeding should consist entirely of carbohydrate, glucose, or Mellin's food made with water. In the Flexner type, on the contrary, carbohydrate should be avoided and the patient fed on whey and later on peptonized skimmed milk. One must increase the diet to normal very gradually, bearing in mind that the digestion is seriously impaired.

For the para-dysenteric group, the treatment is much the same, save that the ordinary specific treatment is of no avail. In such cases of recent times the specific bacteriophage produced by the Calcutta School of Tropical Medicine has proved of great value.

AMŒBIC DYSENTERY

The characteristic symptoms of amœbic dysentery as seen in the adult are rarely seen in young children. Occasionally we meet with cases where the stools are definitely of the dysenteric type though different from those of bacillary dysentery. Faecal matter is present and is of a typical dark reddish-brown colour with which is intimately mixed blood and mucus. The number is usually comparatively small, four or five daily. The abdomen is tender, particularly in the lower part of both sides. There is little or no fever. More usual is a chronic infection of the same organism which leads to obstinate diarrhoea with greyish stools and periodic intervals of obstinate constipation, loss of appetite and weight, vague abdominal pains and progressive anæmia.

Diagnosis in such cases is suggested by the persistent tenderness in the abdomen, sometimes the colon may be felt to be thickened, and this is confirmed by the presence of living amœba or cysts in the stools. One examination is insufficient to exclude the disease and it may be necessary to examine as many as six times after the administration of a non-oily aperient. Not infrequently there is high fever in these cases owing to the escape of *Bacillus coli* from the bowel into the circulation.

Treatment. The patient is put on a soft easily-digested diet of milk, Mellin's food and

a clear soup, and the bowels are kept freely open by small doses of saline aperients, preferably magnesium sulphate. Emetine is a specific in such cases, but children are intolerant and suffer from depression or even collapse if the dose is excessive. For a child of one year the dose must not exceed $1/15$ th of a grain, at four years it should be not more than $1/8$ th, and in both instances the dosage should be limited to six injections. Further treatment is carried out with a view to eradicating the infection, a procedure which may be exceedingly difficult. Carbarsone in doses appropriate to age, 0.075 gramme to a child of four, may follow the emetine treatment. Though this drug is an arsenical preparation it has been given with absolute impunity in a large number of cases, the only adverse manifestation being pains in the abdomen if the bowels are allowed to become constipated. The course of carbarsone is limited to ten days and should not be repeated for three months.

One other protozoal parasite, *Giardia intestinalis*, has been found to produce a chronic diarrhoea with mucus or occasionally a little pus in the stools. The diagnosis is made by the discovery of the living organisms or cysts in the stools. Treatment is by Stovarsol. Dose gr. $\frac{1}{2}$ daily for a child of one year for six days.

INTESTINAL DYSPEPSIA

(Mucus disease or Eustace Smith's disease)

Chronic intestinal dyspepsia is one of the commonest causes of ill health among children in India and is entirely due to errors in the diet, the main error being the preponderance of starchy or sugary food. In European children the general digestive tolerance is lowered in the hot weather at which time the disease usually starts, and improvement is immediately seen on transfer to the hills or to Europe. Not infrequently the predisposing cause is one of the infectious diseases of childhood whereby the general vigour is lowered. The disease lies midway between chronic constipation and chronic diarrhoea and partakes of the character of both.

The symptoms noted by the mother are often those referable to the general nervous system rather than to indigestion. Restlessness at night, night terrors, irritability and teeth grinding are common so that when there is any change in the demeanour of the child or any unusual nervous symptom our first point of investigation is the digestion.

Other symptoms to be noted are, want of energy, actual loss or failure to gain weight, irregularity of the bowels—sometimes diarrhoea and sometimes constipation, and persistent cough due to gastric irritability. It is somewhat misleading that the child does not often complain of pain. The tongue is furred or pale, flabby and glazed, there is sometimes irregular fever and the appetite is capricious. The motions are often slimy, hence the name mucus disease, and

they may contain much indigested matter or may be frothy and large. As a variety there may be the urgent passage of stools immediately after meals, a condition known as lenteric diarrhoea. Associated with this condition we sometimes meet with persistent bed wetting. The general appearance of the child is somewhat characteristic, the complexion is muddy and unhealthy looking, and the face may appear puffy with dark rings under the eyes. He is thin with a marked prominence of the abdomen due to distension. This distension is sometimes so marked that the lower ribs are pushed outwards or the muscles of the abdomen are separated, so that when the child in the supine position lifts his head there is a marked bulging down the centre of the abdomen. When there is much constipation the folds of the skin, as in chronic constipation, will be stained. The treatment is mainly dietetic and is based upon the fact that all the functions of the digestive system are impaired but mainly those of carbohydrate and fat digestion. In many cases the disease is prolonged or accentuated by the administration of tonics, particularly cod-liver oil, before they can be tolerated. During the first stage the diet is limited to skimmed milk with Mellin's food with soup, beef tea or chicken soup and malted rusks such as Allenbury's. With improvement we advance to the second stage and add baked bread, a little honey, fruit juices, boiled fish, minced chicken or mutton and selected vegetables, such as cauliflower or very young mashed carrots. Later, the fish may be grilled instead of boiled and small varieties in the diet are permitted by the addition of such articles as 'Force', Madeira-cake, a very little butter and fruit juice. The third stage consists of the gradual return to the ordinary diet appropriate to the age. There are some articles which must be avoided for a considerable time, notably all articles containing pips, seeds or indigestible husks, such as pineapple, strawberry jam or coarse oatmeal, salt meats, bananas, smoked fish, and whole milk.

Drug treatment.—Rhubarb and grey powders for three days followed by the rhubarb mixture. Where there is much persistent carbohydrate indigestion, as evidenced by much distension of the abdomen, one Takadiastase tablet may be crushed over each meal. Later a tonic such as the following may be given :—

R	Syrupi ferri iodidi	..	..	5js
Q	Extracti malti	..	..	5ijs
	b.i.d., p.c.			

Sunshine and fresh air are essential and where available ultra-violet rays will do much to improve the general tone.

Additional factors :—(a) As in all cases of digestive disturbance in children who have developed their teeth, special attention must be

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TUBERCULOSIS OF THE MAMMARY GLAND

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and

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A REVIEW of the literature of diseases of the breast shows that tuberculosis of this tissue is of infrequent occurrence. Since Sir Astley Cooper described the condition in 1829, about 200 cases have been reported up to the year 1926. Since then some more cases have been described and to these we add a report of three cases from the files of the General Hospital, Madras.

Report of cases

Case I. Clinical history.—R., Hindu female, aged 18 years, was admitted for pain in the left axilla and left breast on 18th November, 1932. She had recurrent attacks of fever and cough for the last eight months. Three months before coming to the hospital she noticed a lump in her left axilla which broke down discharging pus for a week. The discharge reappeared 10 days prior to admission to the hospital. Two days before her admission, she noticed a swelling on the left side of the left breast.

On local examination, there was a sinus in the left axilla extending 3 inches deep from the skin, discharging a whitish thick fluid. Adjacent to the sinus, there was a hard tender mass. The breast below the nipple was tender and warm to the touch.

X-rays showed enlarged glands in the hilum of the left lung, heart displaced to the right, infiltration around the right hilum, and opacity of the right apex. The right supra-clavicular glands were enlarged, and the right cardio-diaphragmatic angle was encroached upon.

Naked-eye appearances.—Externally, about 2 cm. below and to the left of the nipple is seen a circular

(Continued from previous column)

paid to their condition and any decay must be rectified, as frequently digestive disturbances arise owing to lack of mastication of the food; this failure of mastication is due to the tenderness of decayed teeth. Some children are habitual bolters, they do not chew their food at all; this is a matter for education. (b) In all cases of this type we must remember the possibility of infection by worms and when possible stool examination should be carried out. (c) Give water freely, but allow no food or sweets between meals. (d) Allow no food to be eaten after 6-30 p.m., except a cup of milk and a rusk. (e) If possible allow no water at meals, but give freely one hour before or one hour after. (f) Do not give too much milk in addition to a substantial dietary.

Acknowledgments.—I am indebted to Professor M. N. De and to Dr. Profulla Das Gupta for their liberal assistance and practical suggestions in the foregoing article. The article will subsequently appear in the eighth edition of Birch's *Management of Children in India*.

DIFFICULTIES IN THE BACTERIOLOGICAL DIAGNOSIS OF CHOLERA VIBRIOS*

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THE identification of *Vibrio cholerae* sometimes presents extreme difficulties. This is why, in spite of the many attempts of a large number of workers during the course of the last half a century to solve this problem of identification,

* Being a paper read before the Scientific Section of the Calcutta Medical College Centenary on the 30th January, 1935.

(Continued from previous page)

How familiar we all are with cases of sniffing noses, others again that have intermittent attacks of congestion, sometimes one nostril closed, sometimes the other; others complaining of hay fever unable to face dust or pollen, really cases of pseudo hay fever, and not the rare kind which are sensitive to certain substances. All these are cases of badly ventilated noses, and why treatment by desensitizing vaccines fails in many instances is because the distinction has not been drawn between an ill-ventilated nose and one suffering from a true sensitivity to pollen, etc. All these cases call for conditioning, as the first step in any treatment. It happens sometimes that a first conditioning fails to produce a cure, the manipulations should be repeated again and as they are not severe the patient is, as a rule, agreeable to submit as he has had some benefit. Remember that the condition of nose blockage is a very worrying one and the sufferer is willing to go through a lot for relief. It is the establishment of a free airway that is the object in view, and one manipulation may not be sufficient to effect this; the septum has to be persuaded to remain in a new position; it is just the upper and back part which is the offender and is scarcely accessible for a submucous resection. In a few noses there is a bulge of the outer wall high and near the roof, as well as a septum deviation meeting it, making things difficult, and if the surgeon can crack one or the other he is lucky. If you embark on a policy of conditioning noses, you will find them. If I have been able to find them to be so numerous in a country district, they must be in hundreds everywhere. It is simple enough after some experience, and you will earn the gratitude of many, who will come back and describe to you how fresh and cold the air feels passing through the airway you have opened up. Of course it is not all plain sailing, there is perhaps a chronically-inflamed mucous membrane to treat after the conditioning, but it is in a much better position for improvement.

controversy still exists regarding the differentiation of true cholera from cholera-like vibrios recovered from various sources. Only the bacteriological diagnosis will be considered here.

During an epidemic of cholera the bacteriological diagnosis is usually made by simple microscopical and cultural examinations, supplemented, if necessary, by the cholera-red reaction and agglutination tests. But during the non-epidemic periods, or at the beginning of an epidemic when there has been no actual incidence of clinical cholera, a diagnosis is difficult to make even when all the tests have been performed, especially in view of the recent studies which have shown that the non-agglutinable form of the vibrio can produce acute clinical cholera and that this form has been recovered from many fatal cholera cases.

The true identity and significance of vibrios isolated from the 'carriers' of cholera, or cholera 'contacts', and from the non-human sources, such as water, milk, food, flies, sewers, drains, etc., are often very difficult to ascertain and the investigations have to be performed with utmost care. Vibrios found under these conditions often bear such an extremely close resemblance to true cholera vibrios that they can hardly be differentiated from them without an elaborate study consisting of: (a) morphological character, (b) cultural character, (c) biochemical tests, (d) serological tests, (e) animal experiments, and (f) 'phage' lysability. The essential characters by which collectively the vibrio cholera species may be readily distinguished from the other members of the genus are motility, single terminal flagellum, aerobic growth, cholera-red reaction, funnel-shaped liquefaction of gelatin, absence of phosphorescence and pigment formation in peptone-water culture, pathogenicity to laboratory animals by intraperitoneal and intravenous injections, low virulence for pigeons by intramuscular injection and the specific serological reaction with the homologous antiserum. Each one of the characters taken separately has been found to exhibit great variation, so that not only do difficulties in identification arise but there is also a possibility of missing a vibrio during its primary isolation.

The variations mainly noticed during our experimental works may be briefly summarized under the following headings:

(A) Morphological characters (plate XIV, figures 1 to 5)

Appearance.—Apart from the variations of the degree of apparent curvatures, relatively straight organisms have been found. Some strains exhibit very short, thick cocco-bacillary forms; others are elongated and filamentous; there are again others which, to all intents and purposes, resemble bacilli. Recently, an almost coccoid form of vibrio has been isolated from an acute case of cholera.

Morphological characteristics of cholera vibrios (approximate magnification = $\times 600$).



Fig. 1.—Typical *Vibrio cholerae*.



Fig. 2.—Filamentous and spirillar forms of *V. cholerae*.

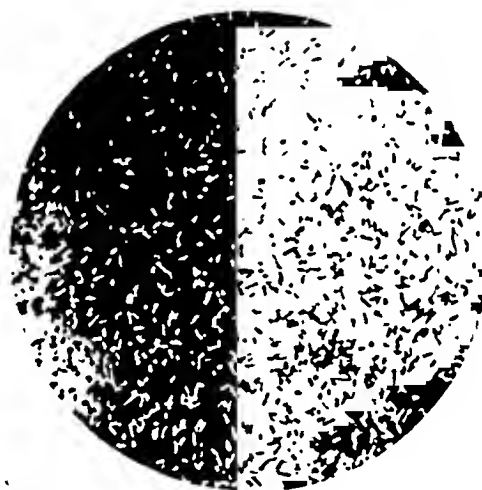


Fig. 3.—Bacillary form of *V. cholerae*.

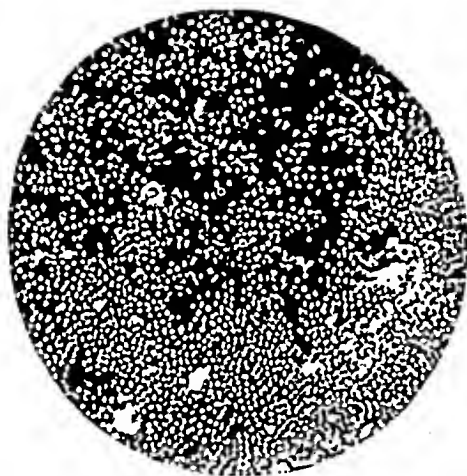


Fig. 4.—Coccoid form of *V. cholerae*.



Fig. 5.—Pleomorphic forms of *V. cholerae*.

In old cultures, however, distorted, highly atypical, and various involution forms have been noticed, e.g., straight organisms, thick swollen individuals, long spirals, spherical forms with faintly-stained centres, pear-shaped and beaded organisms and individuals which present a completely distorted structure. No budding or branching forms have been found, as reported by some workers.

Motility.—The organisms are usually highly motile with 'scintillating' and 'centrifuge' movements, but sluggishly motile forms are not uncommon, and a non-motile variety has also been noticed, in some rare instances, in type cultures of vibrios associated mostly with the changes in colony appearances.

Flagellum.—*Vibrio cholerae* has usually a single polar flagellum to which the movement is supposed to be due. The presence of two flagella, one at each pole or two at one pole, has been occasionally found in single or a group of individuals of the variants, old cultures and some of our recently isolated carrier strains. Multiple flagella have been described by some workers but doubted, except perhaps in the case of *V. massuah* which belongs to the so-called 'paracholera' group.

(B) Cultural characters

Colony appearances.—Colonies of cholera vibrios on alkaline nutrient agar (24 hours' growth) are generally smooth, circular, 1 to 2 mm. in diameter, moist, translucent with a faintly bluish tint gradually becoming brownish on continued incubation. But many fluctuating variations have been noticed both in our primary isolations and in subcultures, e.g., rough dry colonies which undergo spontaneous agglutination in normal saline, opaque colonies with irregular surface, adherent and difficult to emulsify, ring colonies with an opaque centre and transparent border, small tiny colonies (plate XV, figure 6) like those of streptococcus and similar to those described by Gildemeister (1922) as 'dwarf' colonies, and others showing varying mixtures of roughness and smoothness both in appearance and by Millon's test.

(C) Biochemical properties

Proteolytic effects.—One of the chief characteristics of *V. cholerae* is its marked proteolytic action, as exemplified by the liquefaction of gelatin and coagulated serum. These effects are well marked in the recently-isolated cultures with a little variation in the rapidity of liquefaction. But we have many of our collected strains showing poor or completely negative proteolytic effects. There are some which produce proteolysis of coagulated serum but not of gelatin, or *vice versa*. Many of the dissociant forms, however, show completely negative results, while some of the long-cultivated smooth vibrio strains show partial or complete loss of proteolytic effects.

Indol formation.—The nitroso-indol reaction or the cholera-red reaction has been noticed with great constancy, but is in no way the specific effect of cholera vibrio. On the other hand, certain vibrios have been isolated from cholera cases, in which it is absent. The rough variants and some of the carrier strains very often show negative results.

Saccharolytic effects.—The common fermented carbohydrates without production of gas are: glucose, maltose, saccharose, starch and dextrin; various other sugars and carbohydrates are also decomposed by different strains, but these reactions have not served to distinguish *V. cholerae* from the allied species. Lactose is not usually fermented by *V. cholerae*, but late fermentation has been observed in many cases. Some of the carrier strains, studied recently, ferment lactose early, within 24 to 48 hours. Mannite is fermented by most of the strains, but sometimes recently-isolated strains ferment it slowly and some older strains may fail to ferment it altogether. Again some carrier strains have been obtained which do not ferment saccharose. Salicin has been found to be fermented by some strains, specially the variants. It has been found that arabinose is fermented both by a very small percentage of *V. cholerae* and occasionally by the non-agglutinable strains and therefore it cannot be used as a 'test' sugar as claimed by Heiberg (1934). With certain strains there may be acid formation in milk after 3 to 7 days and few strains only have shown a marked acid change and coagulation. Wherry (1904) and others also claim that acid formation in and coagulation of milk are distinct properties of certain strains. These saccharolytic effects have, however, been found to change or vary during the course of laboratory subculture (this is probably associated with the variability of the organisms themselves). A dissociant of a typical smooth cholera vibrio has been obtained, which ferments glucose only with difficulty.

Hæmolytic effects.—Since the observations of Kraus and others it has been held that true cholera vibrios grown on rabbit or sheep blood-agar are usually non-hæmolytic, in contradistinction to some atypical and 'paracholera' vibrios which are actively hæmolytic.

The isolation of six actively hæmolytic strains at El Tor by Gotschlich in 1905 brought the question of hæmolytic action into particular prominence. The strains differed from true cholera vibrio mainly in their production of active hæmolysin, and were declared by Gotschlich and others to be not true cholera vibrios. This evidence of hæmolytic property as a criterion for differentiating non-cholera from cholera vibrios aroused considerable interest as well as a certain amount of controversy; but some of the subsequent workers have claimed that true cholera vibrio may exhibit undoubted hæmolytic effects. According to

van Loghem (1913) and later Greig (1914) and Kovács (1926), the hæmolysis that is observed in cases of true cholera vibrios is a 'hæmodigestion', and not true hæmolysis—a property of the El Tor and some 'para-cholera' strains which produce active 'hæmotoxin' (an exotoxin) that lyses blood with the production of oxy-hæmoglobin, as tested by spectroscopic examination.

We have isolated both hæmolytic and non-hæmolytic agglutinable strains of vibrios from cholera cases, convalescents and carriers. Non-agglutinable vibrios are more hæmolytic, but many strains of agglutinable vibrios have been found to lyse human and not sheep's corpuscles. From a study of more than 400 strains of vibrios Pasricha (1934) concludes that the hæmolytic property of a strain is an extremely variable one and can disappear under laboratory conditions. No correlation between the hæmolytic property and toxicity has been noted.

The variability of the hæmolytic power has been attributed by some to phage contamination, while others consider that the reaction towards the blood is a fairly stable property among the vibrios, being unaltered by lysis with bacteriophage or passage through animals, but the hæmolysin to human blood is thermolabile and is destroyed by heat at 65° to 70°C. within an hour (Zimmermann, 1934). Kolle and Prigge (Kolle, Kraus, Uhlenhuth, 1928), on the other hand, suggest that the hæmolytic action or its absence may be the functions of biological variation and not a stable character.

On the whole, it may be said that the hæmolytic property of vibrios is a variable one and cannot be employed with impunity for the differentiation of vibrio groups.

(D) Serological tests

There are two main types of antibody reaction—antibacterial and antitoxic of which the former is clearly demonstrable in cholera.

Agglutination.—This test has been thought to be highly specific. The serum of a rabbit immunized by a true cholera vibrio and having a titre as high as 1:25,000 will undoubtedly pick out the same type of cholera vibrios from cholera-like and other vibrios. These cholera-like organisms again are highly agglutinated by their own high-titre sera which do not agglutinate the true cholera vibrios. Though the transitional or intermediate forms have not been established it is not possible to say that the inagglutinable vibrios are not true cholera vibrios.

Absorption test and cross-agglutination.—Besides the homologous agglutination, pseudo- and para-agglutinations have been described, but the absorption test of Castellani (1902), designed to distinguish between the group or co-agglutinins and primary or specific agglutinins, has been a real advancement in the

serological tests. We have always found it useful in difficult cases of inagglutinable or partially agglutinable vibrios, and by this method we have been able to corroborate our results obtained by simple agglutination test and compare the serological behaviour with the antigenic structure.

Variability of agglutination.—We have found that by cultivation in the laboratory many of the non-agglutinable forms have acquired agglutinability. From about 40,000 stools of pilgrims at Mecca, examined by Doorenbos (1934), in over five years, only non-agglutinable vibrios were obtained but these, he observes, after one or two transfers on agar have shown properties of agglutinable strains. The occurrence of temporarily inagglutinable forms is particularly observed during the ascending phase of the cholera epidemic and more markedly during its decline. The agglutinable form, on the other hand, is almost universally obtained during the height of the epidemic. Again, persistent and repeated examinations of stools of the healthy carriers, undertaken recently, have revealed that some of them are passing non-agglutinable vibrios at certain times and the agglutinable ones at others. These so-called non-agglutinable forms are not only found in the stools of cholera patients, convalescents and carriers in conjunction with or without the agglutinable variety, but also in waters of wells, rivers, village tanks, sewers and drains.

Influence of seasons, climate, etc., on agglutinability.—The influence of seasons, climatic conditions, temperature, humidity and rainfall on the agglutinability and other characters of vibrios are undoubtedly important factors in the epidemiology of cholera and should be studied.

There is a greater tendency for the vibrios to acquire agglutinability during the winter months in which the agglutinable form has not only been recovered from the actual cholera cases but also from many of the waters of the village tanks and from some of the healthy carriers who had been previously passing the non-agglutinable variety. This preliminary observation, if substantiated, may have a great significance in the natural life cycle of cholera vibrios (with special reference to Lower Bengal).

The technique of agglutination.—The success of the agglutination test not only depends upon its specificity, but also on the methods employed, and on the type of the agglutinogens used, whether H (flagellar) or O (somatic). The application of temperature of 100°C. for two hours to a suspension of cholera vibrios has little or no effect on the agglutinability of the suspension by the cholera antiserum; the O or somatic antigen is highly thermostable, in contradistinction to H or flagellar antigen which is destroyed easily by heat above 60°C. for a few minutes.

The usual type of agglutination reaction done for the identification of cholera vibrios is the flagellar agglutination, but this has also been found to vary according to the different methods employed. For example, some advocate plain suspension in normal saline, some in 0.1 per cent formalized saline, others 0.1 per cent formal-treated 24 hours' broth culture, and so on. It has been recently observed by us (Linton and Seal, 1935) that usually better results are obtained by using living suspensions of 18 to 24 hours' growth on agar in normal saline. Some of the vibrios previously labelled as non-agglutinable have been found by this method to agglutinate with cholera antiserum at a titre as high as 1:1,000 and in one case 1:2,000.

The other factor which is also to be considered is what standard agglutinating serum is being used for the test. The same organisms tested against Madsen, Cantacuzene, Kasanli, Shullong and our own sera often give different results.

Compared to II agglutination better results have been obtained with O agglutination, in our experience, and it is tentatively suggested that this would be a more reliable serological method for the diagnosis of cholera vibrios. The use of pure O antigen would therefore be the best means of preparing the diagnostic antiserum, which, according to our recent experiments, is better tested against the living emulsions.

Another factor which may occasionally lead to some difficulties is the 'zone phenomenon'—a long-recognized common source of error in the interpretation of the results of agglutination tests with organisms in general.

Effect of bacteriophage on the mutability of agglutination.—When a bacteriophage-lysed broth culture or agar-plate culture of vibrio is allowed a further period of incubation, sometimes turbidity appears in the broth and colonies on the agar plate. These are called 'secondary cultures' resistant to bacteriophage. Antigenic changes have often been noticed in these secondary cultures. The appearance of a larger percentage of non-agglutinable vibrios towards the declining phase of an epidemic has been attributed by some to this phage action.

Pasricha, DeMonte and Gupta (1931) observe that a certain percentage (20 per cent of the series tested) of the non-agglutinable cholera-like water vibrios are lysable by cholera phage. Some of the secondary cultures recovered after phage action have been found to be still agglutinated by the antiserum prepared from the parent strains and some by the specific cholera antiserum, thus bringing the latter group into a close serological relationship with *V. cholerae*. From this observation it has been suggested that, in endemic centres, many of the serologically different vibrios are but mutant forms of true cholera vibrios and that these may change into the potential cholera-genic vibrios under the influence of bacteriophage.

Some workers, however, consider that bacteriophage is the essential cause of the variation in agglutination reaction as well as in some of the biochemical and cultural characters of certain vibrios; but such variations have been observed not only as an effect of bacteriophage but also in cultures uncontaminated by phage. It is therefore an open question as to what the significance of these changes may be in the natural history of *V. cholerae*; for the variations produced by bacteriophage have only been possible in our laboratory experiments and it has not yet been absolutely proved that such changes do also occur in nature or inside the human system.

Serological variants.—From the culture of the same specimen of stool of a clinical case of cholera, vibrios have often been obtained which resemble each other in all the characters of a true vibrio except in their serological behaviour, one group reacting and the other not reacting to the specific high-titre serum. Again, there is a greater tendency to find non-agglutinable vibrios or less-agglutinable ones during convalescence and the declining phase of epidemics. Now it is to be determined whether this inagglutinability is due to an alteration in an originally agglutinable vibrio or to an apparent alteration due to the increasing preponderance of inagglutinable cholera vibrios originally present in small numbers, or whether they are to be regarded as non-cholera vibrios having no causal connection with the disease.

The change of originally agglutinable vibrios to inagglutinable forms has been attributed to one of the following factors, (1) symbiosis with other intestinal organisms, (2) growth under increasing immunity in the body and (3) phage action. There are, of course, many authentic cases of cholera in which no bacteriophage could be recovered all throughout the course although the vibrio isolated was non-agglutinable on all occasions; some of these cases ended fatally.

Dissociants and their characters.—Literature on the subject of transformation of the agglutinable to non-agglutinable forms, although still meagre, is gradually increasing and coming into prominence. The change from agglutinable to non-agglutinable forms has been very easy. Organisms derived from a single colony have been found to dissociate into the smooth- and rough-colony forms during the ordinary course of subculture or by the application of various special methods, such as ageing of cultures, growing on phenol-agar, treating with bacteriophage, and cultivating in media containing specific immune serum or high concentration of salt or peptone water, etc. Such dissociated rough forms have been found to lose virulence, agglutinability and some biochemical and cultural characteristics. The change from non-agglutinable to agglutinable forms has also been obtained but mostly with greater difficulty.

Recently, Linton, Mitra and Seal (1935) have obtained much better dissociants from a highly agglutinating 'Rangoon smooth' (plate XV, figure 7) cholera vibrio. One 'Rangoon rough (1)' (plate XV, figure 8) shows moderately rough colonies and reacts barely at 1:200 with 'Rangoon smooth' high-titre (1:12,800) anti-serum, but otherwise resembles its parent strain. The other—'Rangoon rough (2)' (plate XV, figure 9)—shows extremely rough 'medusa-head' colonies, differing from its parent strain and 'Rangoon rough (1)' in practically all its characters. It is not agglutinated at all by the 'Rangoon smooth', 'Rangoon rough (1)' or other anticholera sera. An antiserum, prepared from this non-agglutinable dissociant, agglutinates its homologous strain at 1:25,000, but fails to agglutinate not only its parent strain and 'Rangoon rough (1)' but also most of the other strains tested. Antiserum prepared from 'Rangoon rough (1)', on the other hand, agglutinates its parent strain at 1:200. The above results have been confirmed by absorption and cross-agglutination tests. Thus strains, which, if found in nature, would have been considered unrelated to cholera, have been derived from a typical agglutinating cholera vibrio.

From this variant, again, Linton and the author of the note have, on two different occasions, been able to recover, by special methods, a smooth colony—'Rangoon smooth (recovered)' (plate XV, figure 10)—which resembles the parent strain almost in every respect and agglutinates at 1:6,400 with the previously mentioned 'Rangoon smooth' antiserum. Studies are still in progress to find out whether it has also regained its chemical antigenic structure. At Kasauli also, an originally non-agglutinating and poorly-protective water vibrio has been, during a period of six months' bi-weekly subculture, transformed into an agglutinating highly-protective form resembling a smooth agglutinating cholera vibrio.

The above observations may probably be taken as some evidence in favour of the view that the weakly-agglutinable or inagglutinable vibrios recovered from clinical cases of cholera, cholera convalescents and carriers may be true cholera vibrios. Persons harbouring such vibrios should undoubtedly be regarded as suspects. Instances are not rare in which a possible connection has been noted between clinical cholera cases and healthy carriers passing non-agglutinable vibrios.

Other serological tests

Bacteriolysis (Pfeiffer's reaction), a combination of agglutination and bacteriolysis, the complement-fixation, and the precipitin reactions have been found to correspond closely to the agglutination reaction and are hence attended by similar drawbacks.

Correlation of agglutinability with other characters

The correlation with other serological tests has already been noted, but each one of these tests including the agglutination reaction is but confirmatory to others and none is a final one.

Hæmolytic power and pathogenicity have not been found to correspond with the serological tests. For example, some non-agglutinable vibrios may sometimes be virulent inasmuch as they can produce fatal cholera in man. Smooth and rough forms, on the other hand, may serve to demonstrate a connection with virulence as a character of the vibrio.

Serological reactions in identification

Amongst all the tests by which cholera vibrios are identified a positive serological test is undoubtedly necessary to make the diagnosis absolute, but a negative serum test, as has been shown above, does not immediately exclude the possibility of the organism being a true cholera vibrio. The following account will further illustrate the difficulties in strictly adhering to the agglutination reaction as a diagnostic test: Two strains of vibrios (nos. 20 and 67) isolated from the Mecca pilgrims in 1930, giving positive Pfeiffer's reaction and partial agglutination, were sent to five different laboratories for identification. Out of these five, one laboratory declared both of them as non-agglutinating non-cholera vibrios and one diagnosed no. 67 only as belonging to the latter variety. This variation of the reports from different laboratories may either be due to a variation in the agglutinating sera or more possibly to the actual differences in the strains themselves, that is, depending upon just what colony has been picked up for study and upon the varying constitution of the organism composing it.

(E) Animal experiments

The test of pathogenicity of vibrios into guinea-pigs and pigeons and protection experiments in animals are the last of the series of methods commonly employed for the identification of vibrios. But as man alone amongst the animals is susceptible to cholera, and cholera-like vibrios being more pathogenic to experimental animals, no great reliance can be placed on the results of animal experiments except as a confirmatory test.

(F) Phage lysability

Study regarding the bacteriophage is yet far from complete. New phages are still being discovered and added to an already long list (A to H, K and L and many others). Different vibrios have been found to behave differently with these phages. They may be lysable by one or more of these phages or may be completely resistant to all. 'A'-phage lysability has been held as a criterion for complete smoothness, but smooth vibrios have later on been found by

Colony characters of *V. cholera* and its dissociants (approximate magnification = $\times 40$).

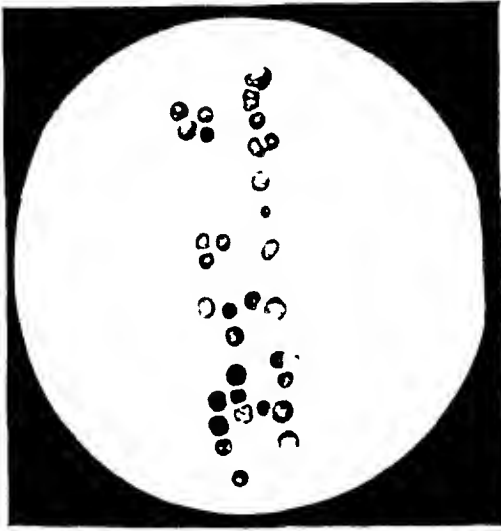


Fig. 6—Small streptococcus-like colonies ('dwarf' colonies).

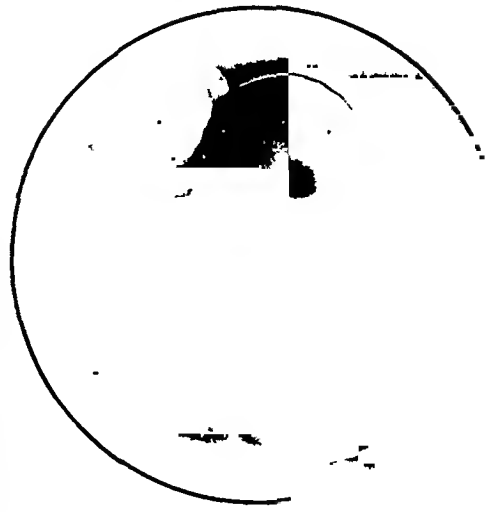


Fig. 7.—Rangoon smooth colonies



Fig. 8—Rangoon rough (1) colonies.



Fig. 9—Rangoon rough (2) colonies

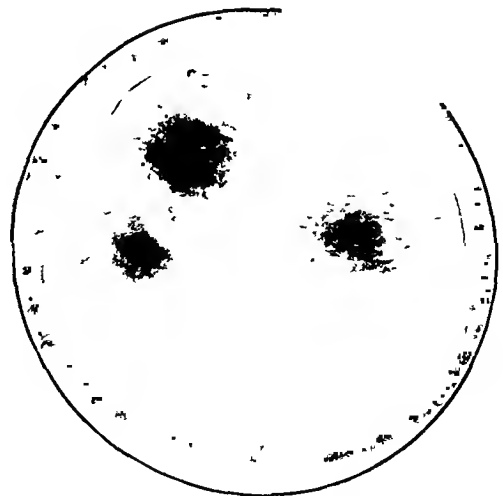


Fig. 10.—Rangoon smooth (recovered) colonies.

Pasricha and his collaborators (1932), which are not A-phage lysable. The difficulty specially arises with those vibrios which are phage resistant. Non-agglutinable vibrios obtained from cholera cases, convalescents, carriers, water, etc., have often been found phage resistant or lysable only by few or mixed phages. On the whole, phage lysis may be utilized as an additional confirmatory test, and this is always done nowadays in all experimental work. Attempts are also being made by the workers on cholera phage to classify vibrios according to their lysability by different phages.

Carrier vibrios

Vibrios isolated from healthy carriers are mostly non-agglutinable but resemble *V. cholera* in many respects. In our recent studies contrary to the previous findings, we have also obtained agglutinable vibrios from some of these carriers.

Perhaps it would also be worth while to test the sera of these contacts and carriers for any agglutination reaction with the vibrios isolated from such individuals, as well as with other known agglutinating and non-agglutinating cholera or cholera-like vibrios, with a view to ascertaining any possible interrelationship between the carriers and the cases.

Conclusion

The position as regards the so-called atypical forms of cholera vibrios is still unsettled. In a disease that is considered to be water-borne, the problem of the extracorporeal existence of cholera vibrios, e.g. in water, is as important as that of human carriers, and so demands very careful attention and further research. Inagglutinable vibrios will probably in future have to be included in the aetiological factors of cholera and be tested with special sera. Also, in the light of recent observations in serological analysis the whole subject of agglutinability should be revised and the statements of the older authors accepted with reservation.

In view of the above facts, either we must get an ideal anticholera serum, sufficiently broad antigenically to include all possible types of vibrios associated with the production of cholera, or we must classify the vibrios into different definite types, as has been done with the pneumococci and the meningococci and, after finding out their interrelationship to each other, prepare type-specific antiserum from each one of them to be used for final identification, or, using our present resources, test the organisms against the various standard agglutinating sera available, e.g., Madsen, Chittenden, Koser, Shillong, and pure-line antisera corresponding to S-, O-, R-, A-phage-lysable strains and to some typical non-agglutinable vibrios.

Also, the convalescent sera showing some titre with the organisms isolated from the stools of the persons affected might be utilized for the

identification of vibrios; in this way it may be possible to show that an isolated cholera-like vibrio, reacting with the convalescent serum, is the true cause of choleraic affections, if not a true cholera vibrio itself.

The attempts at serological and other classification have so far not been successful, as they have been beset with many difficulties which will not probably be overcome until some systematic interrelationship amongst the vibrio groups is found out; and on this will depend the preparation of better diagnostic high-titre sera, a better understanding of the carrier and epidemiological problems and of the position of the so-called cholera-like and water vibrios, and the proper selection of the strains for the preparation of potent anticholera vaccines, sera, etc.

Recently, however, an extensive study of the interrelationship of the whole vibrio group and of the chemical changes which accompany dissociations has been taken up by Linton and his co-workers including the writer. Their basis of grouping is on the actual constituents of which the vibrios are built up, and apparently stands on a better principle. Out of the vibrio strains collected from the different parts of the world, they have isolated two proteins and three polysaccharides, tentatively allowing six groups to be built up combining in each case one protein and one carbohydrate. The special interest of this classification lies in the fact that it not only reveals the interrelationship of the vibrio groups but also suggests a basis for their variations. The relationship of the serological behaviour to the chemical antigenic structure with its changes underlying dissociations is simultaneously being worked out.

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THE USE OF STRAMONIUM FOR THE RIGIDITY AND DROWSINESS FOLLOWING ENCEPHALITIS LETHARGICA

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THE use of stramonium in post-encephalitic conditions, especially for Parkinsonian rigidity and mental apathy, has not received the attention it deserves from the medical profession. With a daily dose of stramonium the patient's life may be rendered comparatively happy. With it, he may be enabled to accomplish the fundamental necessities of life, to walk, dress and feed himself, to write and even to earn his own living. Without it, the patient may be compelled to drag out a crippled and sleepy existence with his daily wants falling as a burden on others. The stramonium must be given continuously in large doses, *e.g.*, half-a-drachm of the tincture thrice daily. At the West Park Mental Hospital, London, many cases of post-encephalitic Parkinsonism are cared for. Most of these patients are kept on substantial doses of the stramonium tincture for many years. If the stramonium be withheld it is found that the patients rapidly relapse to their former pitiable condition. Stramonium is also in common and satisfactory use throughout the British mental and general hospitals.

The history of introduction of stramonium is of interest. In 1895, Erb discovered the calming effect of hyoscine injections for the tremors of paralysis agitans (senile Parkinsonism). About 1914, Dr. Arthur Hurst noted that larger doses of hyoscine could be given with greater benefit and the toxic effects which would otherwise ensue prevented by adding pilocarpine to the hyoscine injections.

When it was found that the Parkinsonian syndrome frequently followed encephalitis lethargica, it was only natural that hyoscine should be tried in this condition also. Quite unexpectedly however hyoscine was found to have little or no effect on the tremor which is

generally much less pronounced than in senile paralysis agitans, but on the other hand was found to exert a very favourable influence on the rigidity following encephalitis lethargica, whereas the rigidity of paralysis agitans remains completely unaffected by hyoscine. In 1926, stramonium was found even more effective than hyoscine in relieving rigidity, slow movement and salivation. The mental, as well as the physical, condition of the patient was also profoundly affected. In 1928, Hurst suggested prescribing pilocarpine with larger doses of stramonium to avoid overdose symptoms of dry mouth, vomiting, and of accommodation paralysis. The result has been most satisfactory and in every case improvement has been shown and at times the whole existence of the patient has been profoundly modified as in the case quoted below.

Mode of action of stramonium.—The nerve centres controlling tone are situated at the base of the brain in the corpus striatum and in the substantia nigra of the crura cerebri. The centres are in turn controlled by impulses from higher centres. Injury to them, as in Parkinsonism, results in excessive tone (rigidity) in the voluntary skeletal muscles. Stramonium contains hyoscyamine, hyoscine and atropine. Drugs of this series abolish the tone of involuntary muscles by paralysing the parasympathetic, *vide* their effect in asthma, but have no action on motor nerves. The injection of cocaine in paralysis agitans abolishes the rigidity by paralysing the sensory nerve endings. Atropine applied locally also paralyses sensory nerve endings, but when given by the mouth it is not considered to have local action. Nevertheless, stramonium by the mouth abolishes post-encephalitic rigidity.

A case of post-encephalitic Parkinsonism

K., a single male, aged 25 years, vegetarian, was admitted on 17th October, 1934, into my ward in King George's Hospital, complaining of (1) weakness and rigidity in both legs with inability to walk, (2) a similar condition in both arms and in the head and the neck, (3) drowsiness by day and insomnia by night, all for the past three months, and (4) excessive salivation for two weeks.

History of present illness.—Nine months back the patient set out from Travancore on a pilgrimage to Rishikesh, which he reached in 14 days and where he lived with Sadhus for five months. During this period he was quite healthy. About three months ago, he got fever which lasted for a few hours and was accompanied by slight shivering. The following day he had a second attack of fever for a similar period. This intermittent type of fever continued for 10 days. He lost his appetite and sleep and became constipated. There was no history of headache, hiccough, vomiting, diplopia, or ptosis, nor of incontinence, but occasional

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incontinence was observed after his admission to hospital. A few days after the fever, the patient appears certain (though his memory is definitely impaired) that he noticed slight weakness in his right arm; then his left arm became weak; then his head and neck; then both legs at the same time; and within a month he could only hobble, all bent and stiff, with the help of a stick. There is no history of any important illness nor of exposure to venereal disease.

Clinical condition on admission.—The patient lies quiet and drowsy in bed, mostly on his left side with the knee drawn up (figure 1). He

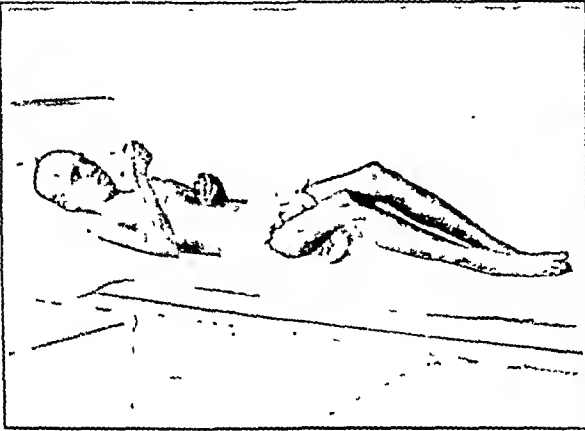


Fig. 1

pays no attention to what is passing round him. The left position is maintained since owing to the weakness and drowsiness considerable difficulty is experienced in turning over. The patient can be readily roused from his stupor if shaken or spoken to sharply, but rapidly becomes apathetic again. He is unable to dress himself and does not ask for food, but will stretch out his hand to take food if he is told to and the food is placed near him. He cannot write, though formerly he did so. He does not leave his bed for defecation, nor to pass urine, but usually calls the ward boy in good time. Occasionally incontinence is present. His body is thin. His face is immobile and mask-like. His head is moved little and his neck is rigid. When his attention is attracted by a noise at one side he turns his eyes in that direction first and not his head. His head, neck and vertebral column move as though they were connected in one piece by a rod of iron. All his movements are laborious, stiff and slow. Mentally he is decidedly dull. He takes long to understand and to reply to questions (slow cerebration). He speaks very slowly. His memory is markedly impaired. Though by day he is always drowsy yet he complains of insomnia and his sleep was much disturbed. Occasionally his eyes deviate outwards and remain fixed for a few seconds (third and sixth nerves) and then float inward again (oculogyric crises). On

closing his eyes, both eyelids quiver rapidly in recurring rhythmic movements. His lips are frequently pursed together. On making an effort to talk his lips also vibrate rapidly (seventh nerve). When he protrudes his tongue, marked fine tremors are noticed (twelfth nerve). He frequently opens his mouth slowly and closes it again (fifth nerve). Dribbling of saliva from the corners of the mouth is present (bulbar involvement). There is no squint, no ptosis and no diplopia. The left



Fig. 2.

seventh nerve is definitely weak, from a nuclear lesion as the forehead wrinkles normally. He does not voluntarily sit up in bed, much less stand or walk. When forced to walk he can only do so very slowly, stiffly and with the greatest difficulty. His shoulders are round and bent forwards and so is his body at the waist. Both upper and lower extremities are weak and spastic, but the right arm is more spastic than the left. The right upper extremity is held semi-pronated, flexed at the elbow, adducted, and with slight ulnar deviation at the wrist. The fingers are partially flexed at the

metacarpo-phalangeal and at the inter-phalangeal joints. The thumb is adducted and flexed over the index finger as in paralysis agitans except that thumb and finger tremors are absent. The patient cannot voluntarily extend his fingers. The grip is impaired. The biceps, triceps and supinator reflexes are brisk on both sides. The abdominal reflexes are present. In the lower extremities, the stiffness is marked, especially on the right. Reflexes on both sides are brisk, more so on the right (tendency to right-sided involvement). Babinski's sign and ankle clonus are absent. The feet on both sides are hyperextended and are somewhat inverted. There is no loss of sensation. The fundus is normal. The spleen is not enlarged. The other systems are normal. The cerebro-spinal fluid

the fever was controlled with quinine, atabrin and plasmochin.

Diagnosis.—The rousable lethargy, the oculogyric crises, the Parkinsonian-like rigidity, the spontaneous involuntary movements in the opening and closing of the lower jaw, with the eyelid, lip and tongue tremors and occasional incontinence left little doubt that the patient was in the chronic stage of encephalitis lethargica.

On the 20th December, the cerebro-spinal fluid showed the following results:—Wassermann reaction—completely negative, albumin—0.15 per cent, no organisms, and two cells per c.mm. The differential diagnosis from meningitis was supported by there being no characteristic changes in the cerebro-spinal

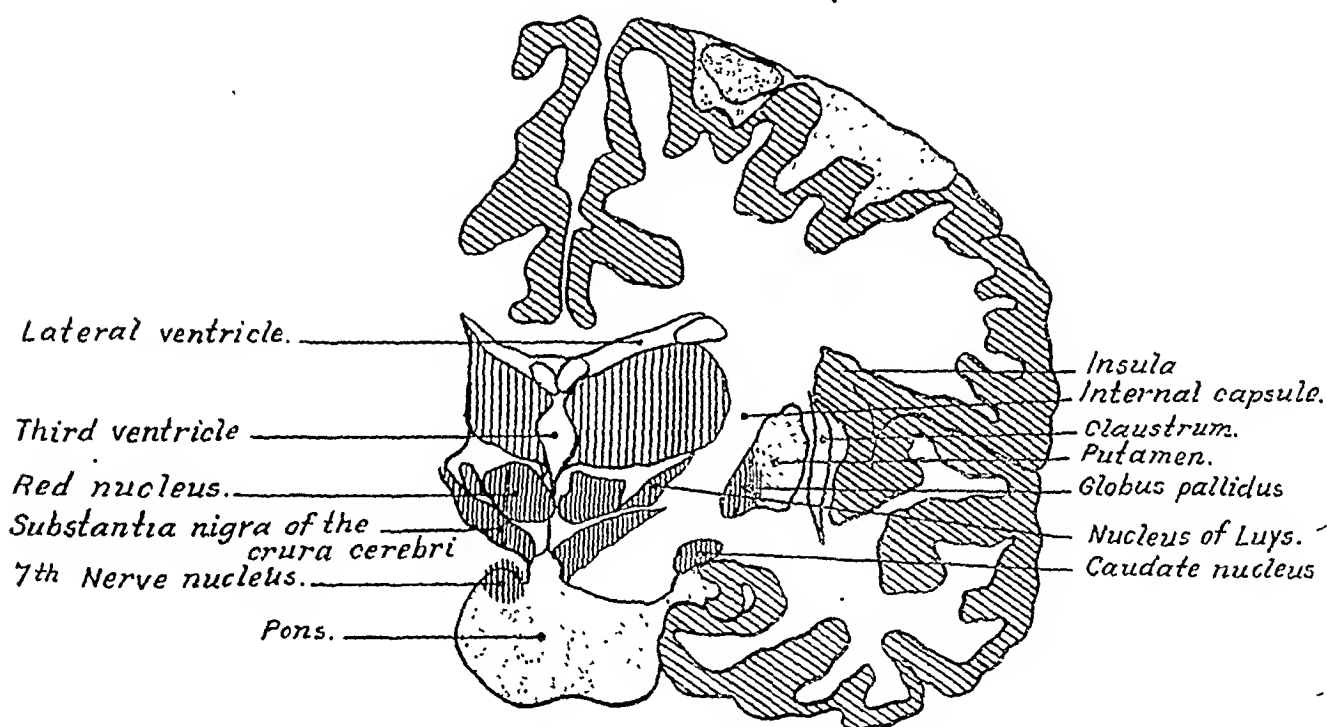


Fig. 3.

(19th October, 1934) was under no increased pressure; 15 c.cm. were withdrawn. Eight cells (mostly lymphocytes) were counted per c.mm., the albumin was 2 per cent, chlorides 67 per cent, and sugar 1 per cent. The Wassermann reaction of the blood and of the cerebro-spinal fluid was completely negative.

On the 17th October, 1934, the day of his admission, the patient's temperature was 105°F. falling to normal and again rising to 102°F. on the 18th October. After the 18th the temperature remained normal for three days when it became definitely tertian for three paroxysms. Though on the 19th October the blood report was negative to malarial parasites, yet the clinical diagnosis of malaria being established,

fluid, from poliomyelitis by the absence of any sign of lower motor neuron lesion, from crossed paralysis due to a tumour or vascular lesion in the pons by the onset of the disease with fever and without signs of any rise in intracranial pressure, as shown by the normal fundus and normal pressure; and finally from syphilitic cerebral lesion by the absence of a positive Wassermann reaction in the blood and in the cerebro-spinal fluid.

Pathology.—In encephalitis lethargica the grey matter of the cortex and of the basal nuclei is rosy pink from inflammation, whilst the white matter is not involved. In the rigidity and the tremors of post-encephalitic lethargica, as in paralysis agitans, the motor

cells in the grey matter of the substantia nigra of the crura cerebri, in the grey matter of the corpus striatum (caudate nucleus and globus pallidus of the lentiform nucleus), and in the grey matter of the subthalamic region (red nucleus and nucleus of Luys) are especially involved. The typical symptoms produced are rigidity, tremors, slow and weak voluntary muscular contractions, and spontaneous involuntary movements. The mental lethargy is probably due to involvement of the cerebral

of the fifth, seventh and twelfth nuclei in the floor of the fourth ventricle.

Treatment

The modern treatment of post-encephalitic Parkinsonism follows three distinct lines:— (1) stramonium, (2) physical drill, and (3) psychotherapy.

Method of giving stramonium.—A start is made with 30 minims of the tincture of stramonium in half an ounce of water thrice daily after meals. Five minims of the tincture is added thrice daily every other day until slight dryness of the mouth or paralysis of accommodation is observed. Then pilocarpine nitrate gr. 1/10th is added to each dose. The stramonium may be increased to one drachm thrice daily with up to 2/5th grain of pilocarpine nitrate. The dose of the two drugs on which the patient feels best is continued for life. In the alternative, pilocarpine may be omitted, and that dose of stramonium only determined which is found best suited to the patient.

Stramonium treatment of this patient.—Tincture of stramonium, 30 minims thrice daily, was prescribed from 16th November, 1934. Within three days the lethargy was diminishing and the patient began to take far more interest in the events around him. He commenced to sit up in bed. On the 21st November, of his own accord, he left his bed to bask in the sun. He started to walk around, which he had not done for the last four months. On this day, a five minutes' walk was prescribed four times daily as part of his treatment. On the 28th November he was able to feed himself and asked for the food delicacies he liked. On the 2nd December he dressed himself and on the 3rd December he went to the bathroom unaided. He now started to desire to earn his living.

Physical drill.—The patient was instructed in physical exercise, such as rising on tip-toe, whilst extending his arm and raising it above his head (figure 2). Later, he was prescribed more complicated exercises and was re-taught to run. The number of times each exercise was to be performed was definitely laid down.

Psychotherapy.—The patient was improving mentally as well as physically. He felt the change in himself, and was very happy. Every morning he would tell the doctor, the students and the nurses that he was feeling much stronger. He was encouraged and praised at every success, he was given tumblers of water to carry about the ward, and some useful light ward duties. He massaged himself with oil with the twofold purpose, that mechanical movement and massage were good for him, and that active mental effort was initiated. The patient was thus encouraged to work for himself and for others as much as possible. Cerebral re-education, physical and mental, was helped in every possible way.

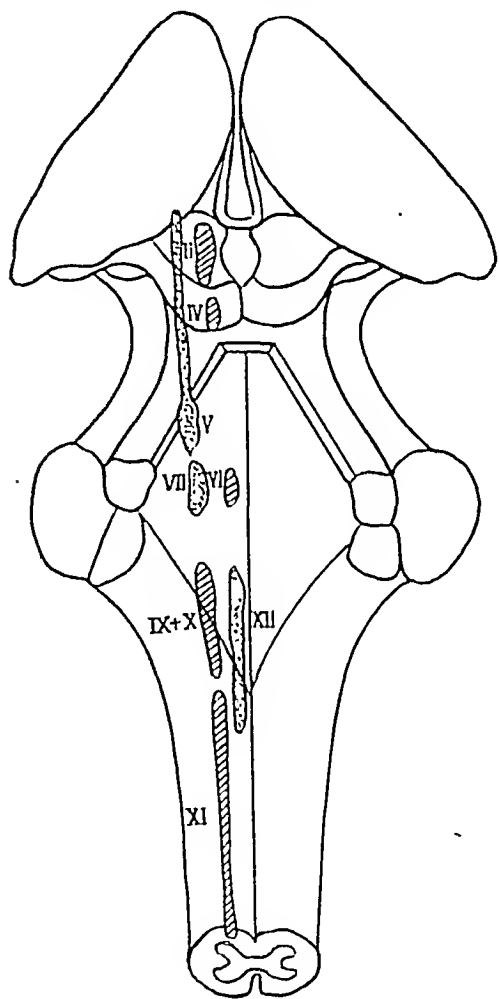


Diagram showing motor nuclei

... Nuclei affected.

Fig. 4.

In the case quoted, the fifth (temporal and masseter muscles), the seventh (eyelids, lips and tremors) and the twelfth nuclei (the tongue tremors) were affected.

cortex. The left facial paralysis, with increased rigidity of the right side of the body, was a crossed hemiplegic manifestation arising from a lesion especially developed in the upper part of the left pons—where the face nucleus for the same side is (see diagram). The eyelid, lip, tongue and jaw tremors are due to involvement

A Mirror of Hospital Practice

CYSTS OF THE SPLEEN

REPORT OF A CASE

By M. M. CRUICKSHANK

LIEUTENANT-COLONEL, I.M.S.

General Hospital, Madras

Cysts of the spleen are sufficiently rare for the report of a single case to be warranted.

A male child of seven years was admitted to hospital on 16th April, 1935, with marked distension of the abdomen. The mother gave an indefinite history of periodic attacks of fever for the past three months.

Examination of the heart.—Left border in the nipple line. Mitral systolic bruit present.

Examination of the abdomen showed some dilatation of the superficial veins, these extending on to the thoracic wall. The abdomen was distended, more markedly so over the left upper quadrant. Palpation revealed a very large spleen bulging from below the costal margin and extending downward to the level of the left iliac crest and inward to just beyond the middle line. A slight rub due to some perisplenitis was felt and percussion showed the presence of some free fluid in the abdomen.

There was some doubt as to whether the mass might not be a kidney tumour, but intravenous pyelography, with uroslectan B, excluded any kidney lesion, calyces and ureters on both sides presenting normal shadows.

The blood picture was normal, as also was the Wassermann reaction.

Splenic puncture produced a dark straw-coloured fluid, which contained albumin, no sugar and no scolices.

Under open ether, the abdomen was opened through a T-shaped incision. The spleen was largely cystic, the bulk of the spleen tissue lying against the ribs.

Any attempt to remove the spleen was negatived on account of dense adhesions to the under surface of the diaphragm and also because gut and omentum were firmly adherent to the cystic tumour.

The tumour was punctured with a trocar and cannula, through a thin superficial layer of splenic tissue, and about twenty ounces of a dark straw-coloured fluid allowed to run off, the cavity then being mopped dry with gauze. A de Pezzer's catheter to drain the cavity was tied in with a purse-string suture, the cyst wall stitched to the abdominal parietes and the abdomen closed. There was no true cyst wall present, the wall being formed by compressed splenic tissue.

The result of biochemical and bacteriological examination of the fluid was:—

Microscopically no organisms seen.

No scolices seen.

Culture—sterile.

Albumin—0.6 per cent.

Globulin—0.3 per cent.

Cholesterol present.

Discussion

Boyd classifies cysts of the spleen as

1. Hydatid.
2. Dermoid.
3. Simple.
 - (a) Hæmorrhagic.
 - (b) Seros.

The hæmorrhagic cyst, the result of trauma to the spleen pulp, in which vessels are easily ruptured, due to the absence of an elastic coat

is, according to Boyd, the commonest form of splenic tumour.

Moynihan gives a much more exhaustive classification of the varieties of spleen cysts, which I give in detail:

A. True cysts with a definite lining layer, epithelial, endothelial or parasitic.

1. Angiectatic { Telangiectasis { Dilatation
Lymphangiectasis { of normal
vascular spaces.
2. Neoplastic { Endothelial { Hæmangioma.
Dermoid { Lymphangioma.
3. Parasitic Hydatid.

B. False cysts bounded by a zone of condensed tissue only.

1. Traumatic { Seros—Multiple and
superficial.
Hæmorrhagic—Large and
solitary.
2. Inflammatory { Acute—Colliquative
necrosis.
Chronic—Tuberculous.
3. Degenerative { Secondary liquefaction of
infarcts.

Large hæmorrhagic cysts are the result of injuries, where the vessels in the spleen are torn and hæmorrhage occurs, and, if the patient survives, a cyst forms the contents of which are blood-stained or, more rarely, pale yellow in colour. A hæmatoma is formed and, as occurs in a cerebral hæmorrhage, instead of becoming absorbed, the clot undergoes softening and liquefaction forming a cyst, the walls of which consist of tough fibrous tissue. In time the blood pigment is absorbed and is replaced by masses of cholesterol crystals, which are present in the wall of the cyst, the colour of the contents therefore changes from a blood-stained to a clear yellow fluid. Such a change naturally takes time, probably months, to occur.

Degenerative cysts are the end result of splenic infarcts, the infarcts undergoing softening, the resulting cysts containing turbid serum or altered blood with cholesterol crystals.

According to Boyd, however, a splenic infarct becomes converted eventually into a mass of fibrous tissue.

In inflammatory cysts the colliquative process results in the formation of a cavity containing blood-stained purulent fluid, the walls being formed by and lined with shaggy and much altered splenic tissue.

According to Moynihan's classification, the cyst in question was a false one, yet it is difficult to decide definitely whether it can be classified as traumatic or degenerative. The large simple cyst containing straw-coloured fluid, with cholesterol crystals, is in favour of a hæmorrhagic cyst, but no history of trauma could be obtained. The condition of the heart might

favour the diagnosis of a secondary degenerative cyst, the result of an infarct.

The character of the fluid and the uniform smoothness of the wall rules out an inflammatory cyst.

TREATMENT OF MULTIPLE WARTS

By R. C. DALAL, L.C.P. & S. (Bom.), S.M.S.
Medical Officer in charge, Dispensary Tankaria
(District Branch)

THE remedies employed in the treatment of common warts have ranged from magic charms to surgical excision, and acids, electricity, carbon dioxide snow and radium have all produced good results in many cases. However, when a large number of warts are present, local destructive measures are tedious and painful and, in children, such treatment is difficult to carry out.

Case.—A girl, aged about 10, was brought to me by her father for the treatment of dark brown elevations on the back of the hand and neck.

On examination I found that they were soft, fleshy and lobulated. From the history it was evident that they were congenital, and that they have increased in size in the last three years.

Treatment.—On the first day I gave the following powder which I instructed her to rub well over the parts and to report on the fourth day.

R/Acid salicylas	..	1 drachm.
Acid boric	..	3 drachms.
Calomel	..	6 drachms.

The man returned with the girl on the fourth day with no change in the condition of the warts.

Then I tried the following prescription, the medicines to be applied externally, and gave her some to apply at home.

R Sulphur sublimatum	..	10 drachms.
Glycerine	..	3 drachms.
Acid acetic	..	5 drachms.

The girl was brought again after a week with no appreciable change in the condition. During this week I happened to read that bismuth injections were specific for the complete destruction of warts, when a large number are present. Accordingly I began with Bismuth salicylate gr. 12 intramuscularly, in the upper outer gluteal quadrant. After a week a second injection was given. During the second week, regression began and I did not give any further treatment until the condition became stationary. Subsequently a third injection was given at an interval of two weeks and after four injections the warts had disappeared.

A CASE OF PELLAGRA

By M. S. H. MODY, M.B., B.S. (Bom.), L.C.P.
M.R.C.S. (Eng.), D.T.M. & H. (Lond.)
Honorary Physician, Sassoon Hospital, Poona

A MALE, aged 24 years, farmer, resident of Saswad (16 miles from Poona), sought admission to the hospital for diarrhoea and inability to walk.

Eight months previously he had an attack of diarrhoea (8 to 10 stools a day), and also developed dark brown pigmented areas on his face, neck, and back of his hands and feet. He felt very weak and was unable to walk without help. He seemed to improve after a month or so and was able to attend to his work on the farm, but in a short time a second attack of the

same complaints occurred, which confined him to bed, as he was unable to walk at all. He also developed glossitis, which prevented him from eating his usual diet.

On admission.—There was a well-marked butterfly-shaped pigmented area, dark brown or almost black, on his face, the dorsum of both hands and the back of his neck were also deeply pigmented. The skin of his hands besides showing the characteristic pigmentation, was very dry and rough and at places peeled a little. The gastro-intestinal symptoms—diarrhoea and stomatitis—troubled him much, the entire buccal mucous membrane was red and inflamed, and the tongue appeared glazed and shining (atrophic glossitis).

Rigidity and spasticity of both lower limbs, with exaggeration of all jerks characterized the nervous manifestations. There was no anaesthesia and he had complete control of his sphincters; ankle clonus and the extensor type of plantar reflex were absent. The spastic paresis made walking almost impossible. He showed the mental state of pellagra in a marked degree, as he was very taciturn and morose, and when spoken to and interrogated he said that he would never get well, whilst at other times he suffered from hallucinations, thinking he was to be operated upon.

In the diagnosis, syphilis, leprosy, and ankylostomiasis were excluded by the usual laboratory investigations.

Treatment.—Immediate improvement began after putting him on a diet liberal in proteins and vitamins, viz. meat, fresh liver, milk, dal, and fresh vegetables in large quantity, marmite and fruits. In addition he also received 'Abidol'. He is now able to walk unaided; the dry and desquamating pigmented areas on the skin have completely disappeared. The former troublesome diarrhoea is now replaced by constipation, which is equally troublesome and needs treatment.

The only symptom that shows no improvement is his pessimistic mental attitude; he still maintains that he is not better and he will never be cured.

Nothing abnormal in the way of diet or mode of life can be found to have any bearing as regards the causation of his disease. His diet is in keeping with his poverty and condition of life, and more or less is the same as that of the vast majority of such ryots, the staple articles being *jowari* chapatis with a little fresh vegetables and dal. Milk, ghee and fruits are a very rare delicacy. He admits taking alcohol, but has left off drinking for the past two years.

REMOVAL OF A LARGE OVARIAN CYST

By RAO SAHIB B. C. VACHHARAJANI, L.M. & S., D.M.S.
Medical Officer in charge, Civil Hospital, Godhra

A WOMAN, aged about 30 years, was admitted into the Mrs. Smart Victory Hospital on 24th June, 1935, for the enlargement of the abdomen, of about three years' duration: the swelling occupied the whole abdomen from the symphysis pubis to the xiphisternum, the measurement at the level of the umbilicus being 70 inches: she said that it first began in the left iliac region and that she was tapped two and a half years ago and some fluid was taken out; the abdomen started getting bigger again and for the last five months it was increasing rather rapidly; lately she experienced difficulty in walking unaided; the skin of the abdomen was shining, the veins were prominent, a thrill was present and she experienced difficulty in taking any food.

The cardiac, pulmonary, and nervous systems were normal. Urinary system was normal.

Vaginal examination.—Cervix normal, movable and low in vagina; she was menstruating regularly every six weeks; she had one child twelve years ago, who is alive.

A provisional diagnosis of an ovarian cyst was made and the abdomen was opened in the usual way. The tumour was found to be so large that it was impossible

for one assistant to lift it out of the abdomen to ligature the pedicle, which was short and broad. It was therefore tapped and most of the fluid, which was black in colour, was removed in this way; adhesions were broken and two strong ligatures were put round the pedicle and the tumour was removed. The total weight of fluid was 46 pounds and that of the sac 2 pounds which is by far the largest I have met with in my surgical practice of over 22 years. I do not like to tap such tumours before removal but in this case it was impossible to adopt any other course. The abdomen was closed layer by layer in the usual way and the woman made an uneventful recovery.

A CASE OF ASCITES TREATED BY AUTOSEROTHERAPY

By BEHARI LALL KAMRA, M.B., B.S.
CAPTAIN, A.I.R.O.

Medical Officer in charge, Rattewala Dispensary,
Ferozpur District

A FEMALE, 19 years of age, was admitted on the 7th December, 1934, to Rattewala Dispensary, with swelling of the feet and legs and enlargement of the abdomen of 1 to 1½ months' duration. About 6½ months ago the illness started with an attack of dysentery, which lasted for about 5 months. About 3 months after the beginning of the illness she aborted and got a left mammary abscess, which ruptured spontaneously and had healed.

The abdomen was uniformly enlarged. The girth measured 34 inches at the umbilicus, which was nearer to the pubes than to the ensiform cartilage.

The abdomen was dull in the flanks and tympanitic in front. The spleen and liver could not be palpated. Fluid thrill and shifting dullness could be easily elicited. Her heart was normal. The pulse was 120 per minute and was small. Moist râles could be heard at both bases of the lungs. There was no jaundice. Edema of both feet and legs was present and came on before the ascites.

She was put on the following mixture:—R. Tincture digitalis— η xx, spiriti ammonii aromatici— η xx, tincture nucis vomici— η v, spiriti ætheris— η xx, aqua ad 1 oz. three times a day. Paracentesis abdominis was performed the same day, and about 20 pounds of clear fluid withdrawn. Its specific gravity was not taken nor could its chemical and microscopical examination be done. After tapping, the girth at the umbilicus measured 30 inches.

One cubic centimetre of the ascitic fluid was given subcutaneously immediately after tapping and some was stored in a sterile phial out of which 1.5 c.cm. and 3.5 c.cm. were injected under the skin on the 11th and 15th December, 1934, respectively. On the 22nd December she was again tapped, and about 12 pounds of fluid withdrawn—this time it was greenish in colour—5 c.cm. was injected, and on 26th December an injection of 10 c.cm. of the stored fluid was repeated.

Whatever amount of the free fluid was left behind after the last tapping now began to be absorbed instead of re-accumulating and on 5th January, 1935, not a trace of it could be detected. The spinal column could easily be felt through the anterior abdominal wall. There was absolutely no swelling of the feet.

Since admission she had been passing four stools a day, on the average. They were always semi-fluid and occasionally contained blood. On microscopical examination they were found to contain cysts of *Entamoeba histolytica*. On 16th January, 1935, she was put on emetine hydrochloride, hypodermic injection of gr. i a day for six days. After an interval of three days three more injections were given and a course of twelve injections was completed after another interval of three days.

The blood and mucus disappeared from the stools and their number was reduced to 1 to 2 a day though

they were still semi-fluid in consistency. A few days after the course of injections was completed the woman showed signs of muscular weakness, starting in the lower limbs, on account of which she was again bed-ridden and was unable to stand up although she could sit. Salol was prescribed and she was discharged on 6th February with emetine paresis but cured of ascites.

She attended the dispensary on the 22nd April, 1935. She came on horse-back from a village five miles away and could walk in all right but was feeling weak in the legs and arms. There was a moderate degree of anæmia. There was absolutely no trace of free fluid in the peritoneal cavity. The urine was normal; no cysts could be detected in the stools which contained no blood and looked quite normal. The liver was palpable.

Evidently this was a case of ascites due to non-suppurative peritonitis and belonging to a class which Megaw (1921) studied and was named 'chronic superior peritonitis' by Sprawson—(Megaw *loc. cit.*), while the presence of amœbic cysts might have been due to an infection superimposed upon an attack of bacillary dysentery. Chronic superior peritonitis causes ascites as the result of fibrosis of the peritoneum following its inflammation. These cases follow diarrhoea or dysentery, probably caused by the bacillus of Flexner or some closely related organism.

Autoserotherapy in ascites is not a new thing. It has already been tried though the reports have not been favourable and conclusive. It may be useful only in the class of cases termed chronic superior peritonitis and the unfavourable results might have been due to treating cases of ascites other than this type. The successful application of autoserotherapy in the above described case has prompted me to report it so that others may try this treatment.

I am greatly indebted to Lieut.-Col. Batra, I.M.S., Civil Surgeon, Ferozepur, for his useful advice and kind permission to publish this note.

REFERENCE

Megaw, J. W. D. (1921). Chronic Dysenteric Peritonitis. *Indian Med. Gaz.*, Vol. LVI, p. 321.

AN UNUSUAL CASE OF CANCRUM ORIS*

By MAGANLAL D. LATHIGARA, M.B., B.S.

Medical Officer, Bilkha State, Bilkha (Kathiawar)

A MALE adult, aged about 24, came to the state dispensary, complaining of toothache on 17th June, 1935.

On examining him I found the two upper lateral incisors painful and the gums over them red and inflamed. Potassium permanganate gargle, tooth powder and gum paint was prescribed. He attended the dispensary for about five days and then ceased coming. The patient did not take any further treatment. He returned on 11th July with a foul-smelling gangrenous slough over the upper lip on the left side just below the left nostril which was partially eaten away. On examining the mouth the gums were found to be gangrenous and both the teeth were loose. Inside the mouth, the mucous lining over the left cheek was black and sloughing, with a very foul odour. His pulse was rapid (110), and he had a temperature over 100°F.

* Rearranged by Editor.

He did not complain of much pain and could take liquid food.

Suspecting the case to be one of acutely spreading gangrene I removed the two teeth and a considerable portion of the slough. On cleansing the part a hole appeared which communicated directly with the oral cavity, just below the left nostril. I irrigated the cavity thus formed with warm Milton lotion and packed it with sterile iodoform gauze. Potassium permanganate gargles were ordered and complete isolation from flies was strictly advised. He attended the dispensary as an outpatient for about a week, during which time the above treatment was carried out. He flatly refused to take any injections. His condition was going from bad to worse and his facial gangrene was spreading.

On the 16th July, when I examined him the gangrene had spread over the cheek and the left side of the nose was destroyed. I had to dissect out the slough daily and by this time the whole of the left nasal cavity was exposed and the gangrene had spread up to the eye. He was unable to walk and refused any food. I advised him to go to a hospital and to get admitted there as an inpatient. He agreed to go but absconded after four or five days and took no treatment for about a week, during which period he was confined to bed at his home and his condition became much worse.

I went and saw him on the 29th July and found the nose completely destroyed, and the nasal and cheek bones exposed. The left eye was gone and the bony margins of the orbit were visible. The lips were also gone and the jaws exposed, and the whole area was crawling with maggots. In spite of the seriousness of his condition he complained of no pain but only irritation caused by the maggots. It was not possible to do anything for the man so I just sprayed the area with weak lysol and removed a number of maggots. He died on the 31st July.

The unusual features of this case are :—

- (1) Cancerum oris is usually a disease of childhood and is comparatively rare in adult life.
- (2) In this case it began as a mild gingivitis.
- (3) The patient was not weak, nor was his vitality lowered so as to account for this acute gangrene of his face.

SPONTANEOUS BURSTING OF A STONE IN URETHRA

By B. R. JAIN, M.B., B.S., F.M.S.

Medical Officer, Konch, Jalaun, United Provinces

A MAN, aged 36 years, was admitted on 20th April, 1935, with retention of urine and extravasation for the last 36 hours.

He gave no history of venereal disease, but had had pain on micturition for the last year, recently becoming worse. About a week ago when the pain became very severe he went to Nadigaon hospital. Here he was given 'something to apply' and he went home. That day while straining in the act of micturition, he felt something give way inside and after that his pain increased. Thereafter he only passed urine with great pain and in drops, and for the last thirty-six hours he has not passed any urine at all. He denies all history of instrumentation.

Present condition.

General.—Patient suffering from severe toxæmia, face drawn, quick and feeble pulse, restlessness, rapid breathing.

Local.—Scrotal tissue oedematous and gangrenous; superficial cutis peeled off exposing red skin beneath;

skin over pubis and right loin red and indurated. Blisters have formed over loin. A similar condition of the skin is present in the perineum where also the cutis has disappeared exposing grey gangrenous tissue beneath.

Bladder region dull on percussion and tender on pressure. Distension up to just below the umbilicus. Bowels not moved for last three days.

Operation.—Under chloroform and other anaesthesia multiple incisions all over the scrotum were made. The incised tissue was gangrenous and urine trickled out freely from the incisions. The perineum was also similarly incised. A full-sized metal catheter was then passed from the external meatus. It went in easily as far as the prostatic portion and there a distinct stone click was heard and felt, and the instrument went no further. One of the cuts already made in the perineum was deepened and a finger put in through the perineal gangrenous tissue. The cut was further deepened by the finger and the stone reached. The stone was found already broken into pieces. Twelve pieces were removed by lithotomy forceps. (The total weight was 6½ drachms and the largest piece was about 1 by ½ inch by ½ inch. The stone was phosphatic and quite hard in consistency.) The catheter then went in easily and the retention was relieved. The wounds were dressed and the patient put to bed.

Shock and toxæmia were treated with glucose and stimulants, and urotropine was also given internally. The skin over the pubis and loin sloughed away during the next three or four days and a large slough came out through the perineal wound. The man was later on put on iron, quinine and digitalis and he steadily improved. On 29th April a full-sized (no. 12 English) catheter was passed, kept in place for ten minutes and removed. The patient passed one more small piece of stone through the perineal wound on the 8th May. On 10th May he had an attack of influenza and got better by the 14th. Thereafter a no. 12 catheter was passed every fourth or fifth day. On the 30th May, a plastic operation was done when the skin over his loin and pubis was undermined, and flaps brought together and sutured. Eight small skin grafts were also taken from the thigh and planted over the scrotal wound. Thereafter he made an uneventful recovery and was discharged cured on 23rd June, 1935.

The interest of the case was the spontaneous bursting of the stone which had obviously been forming in the membranous portion of the urethra anterior to the prostate. The man was very carefully interrogated about any instrumentation being done previous to his coming to this hospital. The medical officer of Nadigaon hospital was written to to find out if he had passed any instruments but he had not done so and the man denied all history of instrumentation previous to admission here. As I have never read nor heard of any stone bursting spontaneously by muscular action only, I am reporting this case.

I have to thank the Civil Surgeon, Jalaun, for permission to report this case.

A CASE OF ASTHMA TREATED WITH OLEO-SANOCRYSYN

By S. M. DAS, M.B.

Sylhet

Patient.—S. R., a Hindu female, aged 19 years.

Typical asthmatic attacks began in the latter part of August 1933, following a miscarriage. It was preceded by nasal catarrh and cough with expectoration

for one year. During this period of catarrh and cough the patient one day coughed up some blood. The period of this first attack lasted for one month, attacks used to occur at intervals of four to five days and lasted for two to three days.

Six months after the commencement in the latter part of March 1934, she had another attack of asthma. This attack was more severe; it lasted for three months. The duration of each attack was six to eight days with an interval of two to three days.

She had a respite for fifteen days followed by another attack like the last which began in the first part of July 1934 and continued up to the middle of October 1934, when she was put under the present treatment.

She denies any family history of asthma or lung troubles. About the past history there is nothing particular except that she had cholera five years back, a miscarriage three and a half years ago and has been suffering from gonorrhoeal endo-cervicitis.

The following conditions were noted when she was put under the present treatment in the latter part of October last:—

There was no attack when she was seen but she had an asthmatic tendency every morning and evening. There was cough with expectoration and rhonchi were present all over the lungs. In the sputum no acid-fast bacilli were found but diplococci and staphylococci were present. She was a little anæmic and a blood slide revealed a normal picture without any eosinophilia. Wassermann reaction was negative. No ova nor parasites could be detected in the stool.

Treatment.—She was allowed an easily digestible mixed diet; protein was not withheld as there was no eosinophilia. She was allowed to have a daily bath in cold water (she was having no bath for the last three months). Taking it to be a case of bronchial asthma she was first given malted cod-liver oil with hypophosphites and a course of six calcium chloride injections (10 per cent 10 c.cm.) twice a week. Cod-liver oil was continued for about three months.

After the course of calcium chloride injections was finished she was given four injections of oleo-sanocrysin in the following doses: 5 per cent 2 c.cm.—two doses and 5 per cent 3 c.cm.—two doses. The urine was examined for albumin before each injection. The injections were followed by some reaction in the shape of a slight rise of temperature and local and general bodily pain. An interval of ten to fifteen days had to be allowed between injections. The course was finished by the first part of January 1935.

All treatment was suspended for three months and then another course of oleo-sanocrysin was begun in the beginning of April last and finished by the first part of May last. The doses were as follows: 5 per cent 5 c.cm.—two doses, 10 per cent 3 c.cm.—two doses, 10 per cent 5 c.cm.—two doses, there were six injections in all. This time there was no general reaction so the injections could be given once a week.

After the initiation of this treatment she had no asthmatic attack and now the lungs are quite free. Although one might wait a little longer before passing any definite opinion about the merits of gold preparations in this case, such a long interval of freedom from attack is distinctly suggestive and encouraging.

I gave six injections of sanocrysin to another patient who had been suffering from mixed bronchial and allergic type of asthma. X-ray picture showed a very thickened bronchial tree, there was eosinophilia about 7 per cent and the patient had been suffering from chronic dysentery. The doses were as follows: 0.01 gm.—two doses, 0.025 gm.—two doses and 0.05 gm.—two doses. There was no evident improvement in the course of the asthmatic attacks. But when the sputum was examined after the completion of the course of injections it was found to be entirely free from organisms and the patient was almost completely relieved of her cough.

A CASE OF ACONITE POISONING TREATED BY HYPERTONIC SALINE BY THE INTRAVENOUS ROUTE

By M. TALUKDER, M.B. (Cal.)

House Physician, Carmichael Hospital for Tropical Diseases, Calcutta

Mrs. X, a private patient living in her own home, took about one ounce of liniment A. B. C. in mistake for *mistura carminativa*, the two bottles being together on her table. As soon as she had done so she realized her mistake and vomited the medicine as far as she was able to do. Medical aid was at once called in and her stomach was immediately washed out with potassium permanganate solution. I saw her after the stomach had been washed out the first time and noticed typical symptoms of aconite poisoning, *viz*, tingling and numbness of mouth and tongue, salivation, nausea and vomiting with epigastric pain. There was a marked sensation of burning in the gastro-intestine and she felt as if her tongue was becoming shorter and the throat blocked. She did not exhibit any of the symptoms of belladonna or chloroform poisoning because the aconite poisoning symptoms masked them. Her stomach was washed out a second time with potassium permanganate solution; but the woman gradually began to sink. Her pulse became rapid, irregular and weak, skin cold and clammy and there was profuse perspiration. She was very restless and was having frequent evacuations of the bowels. She was given injections of strychnine, digitalin, atropin, camphor in ether, adrenaline and caffeine at half-hour intervals and was kept warm by the constant application of hot-water bags and rubbing with powdered ginger all over her body and extremities. She continued to grow worse however, her pulse became more rapid, her eyes were sunken and she had difficulty in respiration. It was now about two hours from the time she had swallowed the liniment and her condition seemed hopeless. Her respiration failed four times and each time it was restored by artificial manipulation. Her radial pulse was imperceptible. On account of the amount of perspiration and evacuations with consequent dehydration I thought it might be of use to give hypertonic saline intravenously. Accordingly three pints of saline were given. Immediately her pulse greatly improved and she had no more attacks of dyspnoea. The pulse was still irregular and rapid and there were dropped beats now and then, but she appeared comfortable and slept for some time. Her improvement was steadily maintained and she was now kept only on adrenaline five minims under the tongue every two hours for twelve hours and then every four hours till forty-eight hours had passed. Her pulse and respiration gradually improved and became normal. At the end of seventy-two hours she was completely recovered. Her mind was quite clear from beginning to end.

This note has been published because, as far as the writer is aware, hypertonic saline has not been previously used in collapse following aconite poisoning, and as this form of poisoning is relatively common in India this record may possibly be of some value to practitioners.

A FOREIGN BODY IN THE HAND

By IQBAL AHMAD, L.S.M.F.

Civil Dispensary, Phularwan (Shahpur)

ON the 22nd of October, I. A., aged eight years, complained that he had severe pain in his hand and that he could not open it. He had a fall on the ground while he was playing.

On careful examination neither fracture, dislocation nor any other sign of injury could be detected to account for such severe pain. The patient told me

that he found a small thorn in his hand which he had removed. Tincture of iodine was applied and the hand bandaged. The inflammation went on increasing so much that, on the first of November, the hand could not be opened at all. The inflammation was more marked on the dorsal than on the palmar aspect. The patient was taken to Kapurthala, where he was shown to several doctors, who said that he had a dislocation of the hamato-metacarpal joint. By this time two small swellings had appeared on the dorsal and palmar aspects of the hand near the above-mentioned joint, and could be easily taken for the ends of the hamate and the fifth metacarpal bone.

On the 26th of November, the patient was taken to Amritsar for skiagraphic examination. At this time the inflammation had disappeared, but a small hard swelling, which was quite painless, had appeared on the back of the hand. Two surgeons were consulted, and the swelling was diagnosed as a fibroma in connection with the tendon sheaths. A skiagram was taken on the same day and the condition then was pronounced to be a chondroma in connection with the fifth metacarpal bone.

The patient was taken back to Phularwan, and it was decided to incise and remove the tumour. As he had bad health due to malaria, the operation was postponed till he improved.

On the 5th of December the swelling was incised under local anaesthesia. The swelling though tense and painless was pointing and a small white point which looked like pus could be seen on it.

On opening the swelling pus came out, and a small black dot could be seen in the wound. On catching the dot with forceps and pulling it out, it was found to be the point of an acacia thorn, which had entered through the palmar aspect of the hand and could not be detected before. It measured 1½ inches in length and was surrounded by a lot of granulation tissue which was scraped and the wound dressed. The patient made an uneventful recovery.

The points in this case are that :—

(1) Irritation caused by the foreign body in the hand led to periostitis. As the foreign body was transparent to x-ray, the radiologist was misled.

(2) As the swelling could be palpated on both aspects of the hand a dislocation was suspected.

TWO CASES OF CAISSON SICKNESS PRESENTING 'APHASIA' AS ONE OF THE CHIEF SYMPTOMS

By M. G. OKA, L.M. & S., B.M.S.

Civil Surgeon, Broach

THE following is a record of two cases of caisson sickness presenting aphasia as one of the chief symptoms. This is rare among the manifestations of the sickness. Usually the symptoms of caisson sickness appear immediately or within a short time after the patient comes out of the air-lock or diving suit, but in this instance they have appeared slowly and after a long interval.

Case 1.—On the 31st January, 1935, G. N., a workman on the Nerbudda bridge, being constructed by the Hindustan Construction Company, had to be seen by the medical officer. It was noticed that:—

1. The patient had lost the faculty of speech.
2. He could not produce any sound in his larynx.
3. His tongue movements unaffected.
4. His hearing capacity greatly impaired.
5. He was very apathetic.

On enquiry it was learnt that the workman had worked in the air-lock for six to eight hours daily for five or six days up to the 25th January. On the 26th he had outdoor duty and on the 27th he developed fever and his speech became incoherent. On the 28th the temperature became normal, but the defect in speech began to increase daily until on the 31st the patient could produce no sound. No paralysis of the limbs was noticed. The nerve reflexes were normal. No rigidity or flaccidity was noticed anywhere. His pulse was 74, volume and tension normal, regular in rhythm and force. There was no specific history and the glands not enlarged anywhere.

Diagnosis.—Caisson sickness. The patient was put in the medical lock* the same night after being given morphia gr. ½ and potassium iodide grs. 10.

COMPRESSION		DECOMPRESSION	
Time	Pressure per square inch	Time	Pressure per square inch
10-10 p.m.	0	10-40 p.m.	30 lb.
10-20 "	10 lb.	10-50 "	30 "
10-30 "	20 "	11-00 "	20 "
10-40 "	30 "	11-15 "	15 "
		11-55 "	5 "
		12-20 a.m.	0 "

With the increase of pressure in the medical lock the following improvements were noticed:—

1. Movements of larynx better; but yet he could not make any sound.
2. Hearing improved.
3. Apathy vanished.
4. Became more intelligent.

1st February.—Lacarnol injection and increased doses of potassium iodide.

2nd February.—A second course in the medical lock; at this time with 2-pound pressure, phonation power began to reappear and with 12 pounds the full power of speech was regained and has been maintained after decompression.

3rd and 4th February.—The patient was kept under observation and allowed to resume duty on 5th February.

Case 2.—R. A., aged 28, a coolie on bridge work, was admitted to the civil hospital on 12th January, 1935, with the following symptoms:—

- (1) Subnormal temperature;
- (2) rapid feeble pulse, weak heart;
- (3) deficient air entry at the base of right lung;
- (4) muttering at random;
- (5) blood-stained sputum.

The apathy of the patient was striking. Apyrexial pneumonia was the provisional diagnosis and treatment began on that basis.

Previous history.—Patient had worked in the air-lock for three months continually for about five or six hours every day. Three days previous to admission he had some remittent temperature with a little cough and laboured breathing. On the day previous to the admission he had passed a roundworm.

No specific history. Glands not enlarged. General build muscular.

The day after admission the temperature went up to 100.8°F.; pulse improved in volume and tension to 120. Respiration 35 and definite crepitations heard at right base. The mental condition was the same.

*The medical lock is a cylinder 6 feet in diameter and 12 feet in length. It is placed horizontally. It has an entrance of 2 × 2 feet which can be tightly closed. The air is admitted through an inlet pipe and is allowed to pass out through an outlet. Both the pipes have valves which can be regulated. The patient is placed in this cylinder and the door tightly closed. Air is then admitted to the required pressure, and then slowly let out. The whole process takes about 90 minutes.

received his qualification or qualifications, and shall request them not to admit him without previous reference to the Council to any examination for any new qualification, which is registrable in the register of registered practitioners. If a name is removed from the register, the registrar shall issue a notification in the *Calcutta Gazette* announcing the removal and forward a summary of the proceedings and findings to the medical journals for publication.

Disposal of appeals from the decision of the registrar preferred under section 23 of the Act

An appeal to the Council, preferred under section 23 of the Act, against a refusal of the registrar to register the name or any title or qualification of any person on the register of registered practitioners, shall be in writing and shall state the grounds on which registration is claimed, the names of the qualifications, and the dates on which and the authorities from whom they were received.

On receipt of such an appeal, it shall be referred to a committee of the Council for consideration and report.

The committee shall have power to call for the original diploma or licence, etc., from the appellant for inspection and also such other documentary or oral evidence as may be considered necessary by them.

At the conclusion of their enquiry, the committee shall make a report to the Council embodying such recommendations as they shall think fit to make, with the reasons for the recommendations.

The appeal, the committee's report on it, and all other documents in connection with the case shall be laid before the Council at their next session.

The date on which the appeal is to be taken up by the Council shall be notified to the appellant. The appellant shall also be allowed, if he so chooses, to represent his case before the Council, either by himself or by his legal representative.

Add the following new rules:—

Rules for the restoration of names to the medical register

RESTORATION AFTER NON-PENAL ERASURE UNDER SECTION 16 OF THE ACT

(1) The Council may restore to the medical register, if they see fit, the name of any person which may have been erased therefrom under section 16 of the Act.

(2) No application for the restoration of a name so removed shall be entertained unless it be accompanied by a declaration from the applicant setting forth the facts of the case, and stating that he is the person originally registered, and by one of the following documents:—

(a) Applicant's diploma;
(b) His certificate of registration in original;
(c) A certificate in the form reproduced below from two practitioners registered under the Act as to his identity;

(d) If the applicant is not resident in Bengal, a certificate signed by two persons, who shall be Magistrates or officers holding a commission in one of His Majesty's Services, Civil, Naval, or Military, or Justices of the Peace, or two resident practitioners registered under the Medical Acts.

(3) A fee of Rs. 5 shall be levied for the re-registration of practitioners whose names have been erased from the register under section 16 of the Act.

'I hereby certify that the aforesaid applicant is the above specified.....whose name formerly stood in the medical register with the following address and qualification*':—

Name †.....
Address.....
Registered qualification or commission.....
Date.....

* Here insert applicant's former address and registered qualification.

† Here insert name and address of person certifying.

RESTORATION AFTER PENAL REMOVAL UNDER SECTION 25 OF THE ACT

An application for the restoration to the medical register of a name removed under section 25 of the Act shall not be entertained before the ordinary meeting of the Council next succeeding that in which the removal was ordered.

If any person whose name has been removed from the medical register by direction of the Council, and who still possesses a qualification entitling him to be registered, makes an application to the Council for the restoration of his name to the register, the following shall be the method of procedure:—

(i) The application shall be in writing, addressed to the Council, and signed by the applicant, and must state the grounds on which the application is made.

(ii) The application shall be accompanied by (1) a declaration made by the applicant setting forth the facts of the case, and stating that he is the person originally registered, and (2) by one of the following documents:—

(a) Applicant's diploma;
(b) His certificate of registration in original;
(c) A certificate in the form reproduced below from two practitioners registered under the Act as to his identity;

(d) If the applicant is not resident in Bengal, a certificate signed by two persons, who shall be Magistrates or officers holding a commission in one of His Majesty's Services, Civil, Naval, or Military, or Justices of the Peace, or two resident practitioners registered under the Medical Acts.

Each of these certificates of identity shall be in the following terms:—

'I hereby certify that the aforesaid applicant is the above specified.....whose name formerly stood in the medical register with the following address and qualification*':—

Name †.....
Address.....
Registered qualification or commission.....
Date.....

(iii) The statements in the application must also be verified by certificates in writing, to be given by two medical practitioners registered under the Act or the Medical Acts resident in the neighbourhood where the applicant had been residing since his removal, who were and are well acquainted with him before and since the removal of his name, and they must testify to his present good character.

(iv) On receipt of the application, it shall be referred by the registrar to the Penal and Ethical Cases Committee, for consideration and report. Before an application is considered by the Committee, the Registrar shall notify the same to the licensing bodies whose qualifications were held by the applicant at the time his name was removed; and shall further, by letter addressed to the person or body (if any) on whose complaint the applicant's name was removed, give notice of the application and of the time when the Committee intend to consider the same.

(v) The Penal and Ethical Cases Committee shall consider the application and may, if they think fit, adjourn the consideration of it to a future date or require further evidence or explanations from the applicant.

(vi) The Penal and Ethical Cases Committee shall make a report upon the application to the Council in camera embodying in that report such recommendations as the committee shall think fit to make, with the reasons for the recommendations.

(vii) The application and the certificates referred to in paragraph (iii) shall be in forms VI and VII in

* Here insert applicant's former address and registered qualification.

† Here insert name and address of person certifying.

the appendix with such variations as circumstances may require. Printed forms shall be kept by the registrar who shall supply them to intending applicants.

THE ALL-INDIA MEDICAL CONFERENCE

THE Central Provinces and Berar Medical Association, Nagpur, will hold the XII session of the All-India Medical Conference at Nagpur, under the auspices of the Indian Medical Association, during Christmas week, provisional dates fixed being from 26th to 29th December, 1935. Besides the scientific section all subjects of vital interest to the medical profession in India, *e.g.*, rural medical relief, health insurance scheme, will be discussed. The scientific section and the exhibition will afford every medical man a good opportunity to see the advances made in this country in medical science. To make the Conference thoroughly representative of the medical profession in India, it is requested that all members of the profession should join the Conference and take part in the deliberations.

THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

THE following candidates are declared to have passed the L.T.M. Examination, Session 1935:—

Passed with Distinction

(Arranged in order of merit)

Biswanath Kar, L.M.F., Government of Bihar and Orissa.
Radhanath Misra, L.M.F., Medical Officer, J. D. Ch. Hospital, Kantamal, Orissa.

Passed

(Arranged in alphabetical order)

Mehar Chand Abbi, L.S.M.F., Medical Officer, Nagrota Rural Dispensary, Kangra District.
Dharmal Beri, L.C.P.S., Rajindra Hospital, Patiala.
Kanukurthy Udaya Bhaskara Rao, L.M.F.
Prangovind Harivallabh Bhatt, L.C.P.S., R. M. O., State Hospital, Chhota-Udaipur.
Sunit Kumar Bhowal, L.M.F.
Sunil Chandra Biswas, L.M.F.
Profulla Kumar Bose, L.M.F.
Baidya Nath Chakrabarty, L.M.F.
Bimal Chandra Choudhury, L.M.F.
Chhajju Mal, L.S.M.F., Sub-Assistant Health Officer, Hoshiarpur.
Susil Kumar Chakrabarty, M.B., Medical Officer, Waverley Jute Mills, Shyamnagore, 24-Parganas.
Dalip Singh, L.M.F., Medical Officer in charge, Manjhooli Dispensary, District Gurgaon.
Abhaya Charan Das, L.M.F., Government of Assam.
Dayal Singh, L.C.P.S., Military Sub-Assistant Surgeon, Jammu Cantonment.

Jogesh Chandra De Sarcar, L.M.F.

Sambhu Nath Gangopadhyay, L.M.F.

Sudhir Chandra Ghose, L.M.F., Sub-Assistant Surgeon, Cawnpore Junction, East Indian Railway.

Gobind Ram Marwahi, M.P.L., Sub-Assistant Surgeon in charge, Jail Hospital, Mianwali.

Gopal Dass Naring, L.M.F., Medical Officer in charge, Nawai Dispensary, Jaipur State.

Pabitra Mohon Gulu, L.M.F.

Jyoti Prakash, L.C.P.S., L.M.F., Victoria Hospital, Ajmer-Merwara.

Kamul Nain, L.M.F., Victoria Hospital, Bharatpur.

Monoranjan Karmakar, L.M.F., Gandrapam Tea Estate, Jalpaiguri.

Manoharlall, L.M.F., Medical Officer in charge, State Dispensary, Tijara (Alwar State), Rajputana.

Md. Mohindkin, L.M.F., District Board, Purnea.

Nandlal Damodar Mehta, L.C.P.S.

Jitendra Nath Putatunda, L.M.F.

Khagendra Nath Roy, L.M.F., Corporation of Calcutta.

Sankara Kurup, L.M.F.

Durga Das Sanyal, L.M.F., House Physician, Campbell Hospital, Calcutta.

Girindra Nath Sinha, L.M.F., Medical Officer, Hazaribagh District Board.

Tribeni Prasad, L.M.F., Sub-Assistant Surgeon, Burma Railway, Mandalay.

Tupulur Viswanatham, L.M.F., General Hospital, Mandapam Camp.

The candidates whose appointments are not mentioned were private practitioners.

THE FIRST ALL-INDIA OBSTETRIC AND GYNÆCOLOGICAL CONGRESS, 1936

UNDER the joint auspices of the Bombay Obstetric and Gynæcological Society and the Obstetric and Gynæcological Society of Southern India, the first All-India Obstetric and Gynæcological Congress will be held at Madras on the 2nd, 3rd and 4th January, 1936. The sessions will be devoted to the consideration of subjects under the following three sections:—

1. Obstetric section,
2. Gynæcological section, and
3. Maternity and Child-Welfare section.

There will be organized in this connection a scientific exhibition, which will include exhibitions of scientific appliances, foodstuffs, drugs and scientific books.

Members of the medical profession are invited to attend the Congress.

Particulars with regard to the programme will be published later. Those who intend to contribute papers to any of the sections are requested kindly to communicate with the President of the Obstetric and Gynæcological Society of Southern India, Government Hospital for Women and Children, Egmore, Madras.

Current Topics

The Diagnosis and Treatment of Intestinal Amoebiasis

By JAMES C. PATERSON, M.D.

(Abstracted from the *Canadian Medical Association Journal*, Vol. XXXII, April 1935, p. 399)

A YEAR before the recent epidemic of acute amoebic dysentery in the United States and Canada, Craig estimated that between 5 and 10 per cent of the inhabitants of the United States were infected with *Entamoeba histolytica*. He obtained this figure from the results of fourteen independent surveys which had been made in different parts of that country. With such a degree of latent infection, it is not surprising

that an acute outbreak occurred in 1933; and, furthermore, if certain requirements for its transmission are again fulfilled, it is quite possible that other outbreaks may occur in the future. Intestinal amoebiasis, then, appears no longer to be a disease peculiar to hot countries, and for this reason the following observations, made during several years of practice in a part of Columbia where amoebiasis is prevalent, may be of interest.

Depending on the severity of the symptoms, cases of intestinal amoebiasis may be divided into three main types:—

1. *Acute amoebic dysentery*.—This is the type which runs a rapid and sometimes a fatal course, death resulting from exhaustion, from gangrene and perforation of the bowel, or from abscesses in other viscera.

This form is comparatively easy to diagnose, and, as a rule, responds rapidly to specific (emetine) therapy. Even the busiest practitioner, with neither the time nor the equipment to make more than the simplest laboratory tests, should be able to diagnose this type in its early stages and treat it successfully.

2. *Chronic amœbiasis*.—The diagnosis of this type is usually more difficult, and its treatment more protracted than that of the acute variety. The symptoms, however, are rarely urgent, and, as special laboratory procedures are often necessary for diagnosis, these cases lend themselves better to hospital than home management.

3. *E. histolytica* 'cyst-passers'.—This type is in reality a mild form of chronic amœbiasis, as some degree of destruction of the bowel wall is always present. Typical cyst-passers, however, are completely symptom-free. Their detection and treatment among food handlers is of paramount importance, both in preventing and controlling epidemics, and they are therefore of special interest to the epidemiologist and public health officer.

Dobell and O'Connor have described the pathological changes in the large bowel and the protozoal findings of each of the three types, in reverse order, as follows:

'The ordinary person infected with *Entamoeba histolytica* passes the cysts of the parasite in his stools. But he has the active forms of the amœba in the tissues of his gut wall, and precystic amœbæ in the contents of the intestine. If the amœbæ irritate his gut sufficiently he suffers from diarrhœa. . . . In his stool we then find, therefore, large numbers of precystic amœbæ—often mixed with cysts in all stages of development. If the injury to the intestine is sufficiently severe the patient suffers from amœbic dysentery. Blood and mucus escape from the ulcerated areas, carrying with them numerous amœbæ from the damaged tissues. The amœbæ now found in the stools are therefore the large active forms, often containing ingested red corpuscles. In typical cases of acute dysentery, precystic amœbæ and cysts are absent from the stool.'

It is apparent, then, that attempts to find active red-cell-containing amœbæ in patients with chronic amœbiasis, or cysts in cases with acute dysentery, are usually futile.

ACUTE AMœBIC DYSENTERY

Signs and symptoms.—As the name would indicate, the most prominent symptom is the frequent passage of bloody-mucoid stools, accompanied by some degree of tenesmus and pain. The diarrhœa may be very severe, but it rarely exceeds ten or fifteen movements in twenty-four hours. The stool is usually of moderate size, although if much tenesmus is present it may be so scanty that the patient is deceived into thinking himself constipated. It is highly odoriferous, and consists, typically, of a mixture of mucus and blood of a chocolate or 'anchovy sauce' colour.

Pain and tenderness of localized areas of the abdomen corresponding to the affected portions of the large bowel are also prominent symptoms. The cæcum, the junction of the descending colon with the sigmoid, and the flexures are the favourite sites of ulceration. The pain and tenderness may be such that appendicitis, cholecystitis, or peptic ulcer is almost perfectly simulated.

The temperature is seldom elevated except in advanced cases and those which have developed hepatitis. Emaciation, as a rule, is progressive, although some patients remain in a surprisingly good condition and insist on continuing their usual activities until an advanced stage of the disease is reached. The white cell count is usually normal, but may be raised to 10,000 to 12,000 in some instances. A higher degree of leucocytosis in a frank case of amœbic dysentery usually heralds the onset of amœbic hepatitis.

Diagnosis.—The diagnosis of acute amœbic dysentery may be made in three ways; viz, by the identification

of the amœba on microscopic examination, by the symptomatology and the macroscopic appearance of the stool, or by the therapeutic test with emetine. The last two methods of diagnosis, however, should only be used in special circumstances.

The one indispensable factor in the microscopic diagnosis of *E. histolytica* in a fresh stool smear from a case of acute amœbic dysentery is the presence of an amœba which exhibits active movement while at body temperature and contains ingested red corpuscles. Active amœbæ from stools which have been allowed to cool to room temperature, especially in temperate climates, are usually not *E. histolytica*. The stool must therefore be absolutely fresh; it should be passed at the physician's office, or if the patient is confined to his house the microscope should be taken there and used at the bedside. *Entamoeba histolytica* is recognized as a colourless body, three to five times the size of a red corpuscle, it manifests definite amœboid movement, and contains one or more red cells which roll about in the interior of the amœba as it flows across the slide.

The technique of examination is as follows:—The necessary apparatus consists of a microscope fitted with a 1/6-inch objective, an ordinary glass slide and coverslip, and a wooden applicator. The specimen must be collected in a dry container devoid of disinfectant or urine. A small piece of blood-streaked mucus is extracted with the applicator, smeared on the slide, the coverslip is applied and pressed firmly down, and the smear is then immediately examined.

The onset of acute diarrhœa in a person residing in a region where amœbiasis is epidemic may be considered presumptive evidence of *E. histolytica* infection. If the condition is not relieved by catharsis, and the typical macroscopic appearance of the stool is present, immediate institution of emetine therapy is justified, even if microscopic examination has already been found negative, or if for any reason it cannot be made at once. This course was followed by the English forces in the Mediterranean during the late war, i.e., emetine was begun while waiting for the laboratory report.

The therapeutic test with emetine is a necessary adjunct of the above and need not be considered further. It is of particular value in obscure cases of amœbic hepatitis, when, as often happens, the amœbæ cannot be demonstrated even on the most exhaustive examination. If the temperature and leucocytosis in one of these cases are lowered following emetine therapy the trouble can usually be considered of amœbic origin.

Treatment.—The patient should be confined to bed and kept on a liquid diet until the acute stage of the disease is passed. No red meat, alcohol, or starchy food should be taken for one month following the termination of treatment. Daily hypodermic injections of emetine hydrochloride must be commenced immediately the diagnosis is made. Bismuth subnitrate, which has a valuable astringent action in this disease, should be given in massive doses three to five times a day. Opium can be given in moderation if much pain or tenesmus is present. With such treatment the acute symptoms should be controlled in from three to five days, and sometimes earlier. More drastic measures, such as wide-open cæcostomy or appendicostomy, with bowel irrigation, should not, in my opinion, be attempted until emetine has been given a fair trial. As a matter of fact, I have never seen an acute case of amœbic dysentery which did not respond to this drug, so my experience with other methods is limited. It must be admitted, however, that emetine, although it relieves the acute symptoms and so saves life, unfortunately rarely cures. Some follow-up treatment with yatrien or with one of the arsenicals is therefore necessary in almost every instance. This should be begun on the cessation of acute symptoms or when the course of emetine is terminated, and be repeated whenever the amœbæ reappear in the stool.

CHRONIC AMOEBIASIS

Signs and symptoms.—The stage of the disease, in the variety of its symptoms, may simulate almost any gastro-intestinal ailment common to either temperate or tropical climates. Acute exacerbations, characterized by the frequent passage of painful, blood-streaked stools, may occur at any time, and are predisposed to by physical exhaustion, alcoholic or dietetic excess, and over-exposure to cold. These acute attacks should be classed and treated as cases of acute amoebic dysentery. As a rule, however, these patients do not particularly suffer from diarrhoea and when it is present it usually is of constipation.

and other symptoms of chronic dyspepsia are common. Pain and tenderness of localized areas of the abdomen, and palpable thickening of the caecum and sigmoid are other fairly constant features. Neurasthenia, loss of weight, and other indefinite symptoms are sometimes complained of by these patients.

On the whole the symptomatology is unsatisfactory, and if intestinal amoebiasis is not kept in mind the diagnosis may easily be mis-led. As in the acute variety, appendicitis, cholecystitis, and peptic ulcer enter into the differential diagnosis, and if there has been much tissue hyperplasia about a localized site of chronic ulceration, malignant tumour of the bowel or rectum may be confusing. Such tumours commonly occur at the junction of the descending colon with the sigmoid, where they may be felt as fusiform swellings the size of a hen's egg.

With the onset of hepatitis, a complication not infrequently encountered in untreated chronic or acute cases, the symptoms become more definite. Severe pain is felt over the entire hepatic area and is often referred to the right shoulder. The liver is enlarged and its lower margin extremely tender. Signs of involvement of the right lung base are sometimes present. Low-grade pyrexia, a definite leucocytosis, and symptoms of toxæmia are constant features. A description of liver abscess is outside the scope of this article; in brief, its onset is marked by chills, a leucocytosis of 15,000 to 25,000 (with not more than 80 per cent of polymorphonuclears), and by an exaggeration of all the signs and symptoms of amoebic hepatitis.

Diagnosis.—Except in the case of amoebic hepatitis which may be recognized by the therapeutic test with emetine, the only certain method of diagnosis is by the detection of *E. histolytica*, either in the stool or in the scrapings obtained at sigmoidoscopy. The search may entail many exhaustive examinations before it is rewarded, and for this reason hospital investigation is usually to be preferred for these cases. Once diagnosed, and while undergoing treatment, however, these patients may resume their normal activities, except when emetine is prescribed, in which case they should remain in bed until the course is terminated.

The laboratory diagnosis of chronic *E. histolytica* infections may be made by using three types of preparations—fresh stool smears, iodine smears, and hæmatoxylin-stained smears. Each of these is of value in identifying the cystic stage of the amoeba. The hæmatoxylin-stained smear, however, is the only satisfactory method of identifying pre-cysts and those motile amoebæ which do not contain ingested red corpuscles. As the cyst is the predominating form in the stools of most cases of chronic amoebiasis (unless saline catharsis has been employed), a few remarks on its more important characteristics may be of interest. In fresh stool smears, by which method *E. histolytica* cysts can be recognized in over 90 per cent of the cases, the diagnosis hinges on the presence of the typical chromatoid bodies. These, with the proper illumination, appear as highly refractile, cylindrical bars with blunt (but not splintered) ends. These chromatoid bodies are of such diagnostic importance that their presence will accurately differentiate the cystic forms of *E. histolytica* not only from the cysts of the non-pathogenic amoebæ but also from such confusing

objects as *Blastocystis hominis*, food particles, and oil and air bubbles. They are not present in every *E. histolytica* cyst in a given smear; if they are absent in all, which occasionally happens, an iodine-stained preparation should be made. This method will bring out the two pairs of small, eccentrically-placed nuclei, a number and arrangement which is another point of differentiation. If any doubt still remains about the identity of the cyst one should resort to a hæmatoxylin-stained smear. This rather elaborate method of staining will reveal not only the chromatoid bodies and the arrangement of the nuclei in the cyst but also the minute details of nuclear structure. Hæmatoxylin staining is of most value, however, in identifying pre-cystic forms and those motile amoebæ which do not contain ingested red cells. As a matter of fact, these last two forms cannot be satisfactorily identified, except perhaps by experts, in any other way than by their nuclear structure, and if they are the only ones present in a stool hæmatoxylin-stained smear should always be used.

Summarizing, then, fresh stool smears are satisfactory for the diagnosis of active amoebæ which contain ingested red cells (acute amoebic dysentery), and of cysts which possess typical chromatoid bodies; iodine smears are useful in the diagnosis of those rare cases in which the cysts do not contain chromatoid bodies; and, finally, hæmatoxylin-stained smears are essential for the identification of pre-cystic forms and those motile amoebæ which do not contain ingested red cells. With such a routine, an accurate differentiation of *E. histolytica* from the non-pathogenic *E. coli*, *E. nana*, *I. butschlii*, and *D. fragilis* can always be made.

In securing a stool for examination, a natural movement is best, but a mild laxative, such as alophen or cascara, may be given if no natural movement is present. The first semi-soft stool after such catharsis often contains cysts, and may therefore be used for diagnosis; later watery movements are unsatisfactory, as the cysts have all been washed away from the lower bowel and pre-cysts and motile amoebæ, which are diagnosed with more difficulty, are present in the watery stools. Watery stools are useless for diagnosis, as they invariably wash off the cysts. Saline catharsis, however, may be used in those cases of slight infections in which natural stools give persistently negative results. As a result of the violent purgation the stool of such cases will sometimes contain a few pre-cysts or motile amoebæ. The identity of these forms cannot, of course, be definitely established at this time, but, later, an exhaustive search can be made for cysts which now we can be sure will appear eventually in the stool. Finally, sigmoidoscopy, with the microscopic examination of the scrapings obtained from the base of ulcers found in the rectum or sigmoid, may be useful in the diagnosis of obscure cases.

Treatment.—The diet is important and should not include red meat, alcohol, or starchy food during treatment or for one month following its termination. If amoebic hepatitis is present, daily injections of emetine hydrochloride are always indicated. Cases which show definite signs of bowel irritation are also best treated with a preliminary course of emetine. This may take the form of emetine hydrochloride injections or emetine-bismuth-iodide may be given by mouth. Daily instillations of yatrien solution into the bowel are useful in those cases which are receiving emetine-bismuth-iodide. Follow-up treatment with yatrien or with one of the arsenicals is usually necessary after either form of emetine therapy. This may be commenced after a rest period of one or two weeks. For milder cases, yatrien (with or without long courses of bismuth subnitrate), and carbarsone or stovarsol, are usually sufficient. Patients receiving these drugs can safely continue their usual work. Periodic stool examinations should be made after each course of treatment, and a cure should not be claimed until at least seven consecutive daily examinations have been found to be negative.

E. histolytica CYST-PASSERS

Because these people do not complain of symptoms, it by no means follows that they are free from pathological lesions. *E. histolytica* lives at the expense of its host, and therefore some degree of ulceration of the intestinal mucous membrane is always present. The ulcers may have far-reaching and even fatal consequences. They may rupture a blood vessel and cause severe intestinal hæmorrhage; they may burrow through the bowel wall and produce perforation; the amœbæ may be carried to the liver, *via* the portal circulation, and set up an amœbic hepatitis or liver abscess. It is hard to imagine how such serious complications can suddenly develop in those who have never complained of symptoms, but it is a matter of record that they do.

The infection in these cyst-passers, then, is always dangerous and should be treated as soon as it is discovered. It is, however, of far greater danger to the rest of the community than to the cyst-passer himself. When present in a food handler, especially if he is careless in his personal hygiene, the infection may be passed on to many others. Cyst-passers, therefore, are of special interest to the public health officer, and if in epidemic of acute amœbic dysentery develops in a community they should be sought and forced either to undergo treatment or to change their work.

Diagnosis.—In the conduct of a protozoal survey, which is the most practical method of diagnosing these symptom-free cases, the preparation of hæmatoxylin-stained slides will be found to be of great service. Immediate fixation in Sclaudinn's fluid and subsequent passage through 95 per cent alcohol into 70 per cent alcohol are done at the point of delivery of the specimen, and the slides are then sent immersed in the last solution to the central laboratory, where staining is completed and the microscopic examination made.

Treatment.—With the exception of emetine, the various drugs in use for the treatment of chronic amœbiasis are indicated. Following one or more courses of yatren or one of the arsenicals, the stool should be carefully watched for a reappearance of the parasite.

MISCELLANEOUS DATA ON AMŒBICIDAL DRUGS

Emetine hydrochloride is given by subcutaneous injection in 1 grain daily doses for eight or ten consecutive days. During the course of its administration the patient should remain in bed. The toxic symptoms of over-dosage or idiosyncrasy are asthenia, emaciation, mental depression, neuritis, a soft and irregular pulse, and changes in the skin and nails. Actually, emetine does not appear to be nearly as toxic as current reports would have one believe, and in the course of many hundreds of injections I have only seen one patient who definitely appeared to suffer from its use. This individual developed a beri-beri-like polyneuritis of both lower extremities which only disappeared after prolonged stay in hospital. Minor symptoms of emetine toxicity, such as weakness and depression, are fairly common, but if the patient is kept at rest during the administration of the drug there does not seem to be any definite contra-indication to its use.

Emetine-bismuth-iodide is always administered orally. It should be dispensed in gelatin capsules, as keratin-coated tablets are not properly absorbed. The dose for adults is 3 grains daily for ten or twelve consecutive days, but the first two doses may be reduced to 1 and 2 grains respectively. The drug should always be given at night, four hours after the last meal. Vomiting and some degree of diarrhoea are indications that the contents of the capsules are being properly absorbed, but the former may be lessened by giving 10 to 15 minims of Tinct. Opii half an hour before the evening dose. With emetine hydrochloride, the patient should remain in bed while the drug is being given.

Bismuth subnitrate, after the method of James and Weeks, is administered in heaped teaspoonful doses (about 180 grains) well mixed in a glass of water, soda

water, or milk, three to five times a day, over a period of from one to three months. Toxic symptoms occasionally develop but these are said to be due to impure bismuth. Recently I have observed severe cyanosis and dyspnoea in two young infants who had received large doses (about 40 grains) of a supposedly pure product, and it appears that the formation and absorption of nitrous acid in the large bowel may sometimes be the underlying cause of these alarming symptoms. Regardless of their ætiology, however, they rapidly disappear following prompt purgation with magnesium sulphate.

Yatren is usually given by mouth, but may be used as a rectal instillation in combination with emetine-bismuth-iodide. Orally it may be given in doses of one to four pills (of 0.25 gram each), three times a day, for seven to fifteen consecutive days. Annoying diarrhoea is the only evidence of intolerance to yatren, and its dosage should be governed by the severity of this symptom. As a matter of fact, chronically-constipated individuals are almost the only ones who can tolerate more than six pills of yatren a day in comfort. When given by bowel, a cleansing enema of 2 per cent sodium bicarbonate solution should be injected first. An hour later, 200 c.c. of a warm, 2.5 per cent solution of yatren is introduced and retained as long as possible. The instillation may be repeated each morning for ten consecutive days.

Stovarsol (acetylarsone, paroxil, spirocid) is given by mouth in doses of two tablets (of 0.25 gram each) daily, or one tablet, morning and night, for one week. After a rest of seven days the same course is repeated. Toxic symptoms are those of arsenic generally, and usually take the form of an erythema. This drug should not be used in the presence of renal or hepatic disease. Carbarsone, which, experimentally, is less toxic but more amœbicidal than stovarsol, is given in doses of one capsule (of 0.25 gram), morning and night, for ten days. As with stovarsol, it should not be used when renal or hepatic disease is present.

Newer Methods of Treating Peptic Ulcer, Constipation, and Indigestion

By GEORGE CRILE, M.D.

(From the *New York State Journal of Medicine*, Vol. XXXV, 15th April, 1935, p. 422)

TWENTY-FOUR years ago in an Ether Day address at the Massachusetts General Hospital, I enunciated certain principles which have ever since found their application in the Cleveland Clinic in the development of certain methods of treatment and prevention of those diseases in particular which by virtue of their origin and nature we have termed kinetic diseases. Twenty years ago I performed the first of a series of operations in which adrenalectomy was either performed alone, or was combined with sympathectomy or with thyroidectomy or with both, for the purpose of lessening the 'kinetic drive' to which these diseases are due. Later we not only added peptic ulcer to the list of the kinetic diseases but found that constipation and indigestion might be due to the same kinetic causes, and we found also that bilateral denervation of the adrenal glands gave more permanent results than adrenalectomy because of the tendency of the remaining adrenal to compensation. Recently we have found that unilateral denervation with division of the greater splanchnic nerve is as effective as bilateral denervation in many cases.

We shall cite certain case histories which offer evidence in support of our assumption both that peptic ulcer, chronic indigestion, and constipation may justly be termed 'kinetic diseases' since they are due to pathologic physiology of the energy system, and that these conditions are ameliorated or cured by adrenal denervation, but first I shall discuss the rationale of this procedure in such cases.

That the psychic factor exercises a powerful control, not only of the gastric secretion but also of the entire digestive tract and digestive processes, is a matter of common experience, and that the adrenal glands are concerned in the production of these disturbances has been abundantly proved by the investigations of Cannon and others.

This power of the adrenal glands over the gastro-intestinal tract would appear at first sight to make all animals above the level of the reptiles equally liable to peptic ulcer, to indigestion, to constipation. Yet we know that this is not the case for wild animals do not have peptic ulcer nor indigestion and, even among humans, peptic ulcer and indigestion occur rarely in primitive man and are found most commonly among teachers, lawyers, physicians, clergymen, business executives, diplomats, and that large group in other walks in life that are worried and have many anxieties, have indigestion or are constipated. Among the different races those of a nervous, high-strung disposition are more liable to have digestive disturbances than are those of a more phlegmatic type. Thus peptic ulcer occurs more commonly in the Jewish and Latin races than in the Nordic races.

Where is the cause of this difference to be found? Anatomically it would seem that all animals and all humans possess alike an adrenal-sympathetic system, and that just as the heart performs the same function in each, the adrenal-sympathetic system should function alike in each with identical results. By such reasoning we are leaving out of account two other essential units of the energy system of man and animals, the brain and the thyroid gland. Let us study for a few moments the comparative anatomy of this energy system.

From the point of view of their control of energy we may consider the animal kingdom as divided into three groups, although of course no absolute grouping is possible as there must be an overlapping for some animals have characteristics which pertain to each of two of the proposed groups.

1. The first, which we call the protected group, includes animals whose safety depends upon chemical or mechanical devices such as carapaces, quills, poisons, odours, or upon concealment, such as the armadillo, skunk, porcupine, alligator. These animals require for safety but little expenditure of energy, and therefore the whole energy equipment is relatively small.

2. The second, which we call the pure energy group, includes animals whose survival depends upon the expenditure of energy in attack or escape, such as the lion, fox, antelope, squirrel.

3. The third, the strategy group, includes those animals which depend mainly for survival upon the direction of energy by a controlling brain.

In animals in the second or pure energy group the adrenals are larger and the adrenal-sympathetic system is more complex than in either of the other groups. In the protected group not only are all the units of the energy system relatively small but the adrenal-sympathetic system is exceedingly simple in its connections. In both the pure energy and the protected groups the adrenal glands are larger than the thyroid gland; in man the thyroid gland is larger than the adrenal glands and in both these groups the adrenal-sympathetic system is complex and more so in the pure energy group than in the strategy group. In a fox and squirrel, for example, the weights of the adrenal glands were respectively $3\frac{1}{2}$ and $7\frac{1}{2}$ times larger than the thyroid gland, while in man the thyroid gland weighs approximately twice as much as the adrenal glands.

The thyroid gland maintains the level of activity of the brain and its size therefore depends upon the rate and constancy of demands for energy production. The thyroid gland, therefore, has reached its highest development in man in whom the demands for energy are ceaseless. The size of the adrenal glands and the complexity of the adrenal-sympathetic system depends upon the need for the sudden use of energy in attack or escape. This system has therefore reached its highest

development in animals like the lion and tiger, in which there is need for sudden and fierce attack in securing prey, while between the times of attack or escape there is little need for energy as the time is spent in eating and sleeping.

In what way can these facts contribute to a better understanding of peptic ulcer?

The specific action of the adrenal-sympathetic system as we have stated is to inhibit every organ and tissue that is needed for the great muscular activity of the attack or escape. Among the organs most affected therefore are those of the digestive system.

Thousands of years ago in the ancestor of present-day man, we may believe that since his safety depended principally upon muscular attack and escape, the adrenal glands might well have been larger than the thyroid gland. Primitive man attacked, secured his food, escaped to the trees and slept. As the ancestors of man came out of the trees, however, as his hands guided by the developing brain developed new methods of sustenance by tilling the soil and domesticating animals; as the developing brain showed the advantages of co-operation with his neighbours, in times of stress and fear his adrenal-sympathetic system still continued to act as if active physical struggle was required, and therefore the gastro-intestinal tract was inhibited. The physical activities of attack and escape remain among man's racial memories and although the highly developed brain of civilized man has devised religions, laws, customs and systems of education, yet it cannot eradicate the racial memories which are woven in the protoplasmic net of inheritance. It follows that the mechanism by which motor acts are performed and the mechanism by which emotions are expressed are one and the same.

Civilized man is subjected to innumerable actions but much restraint. The more highly civilized the man is, the greater in number are the exciting stimuli, the greater the restraint.

Because of our complicated life, we have many fears—fear of the loss of money and property, fear of moral disgrace, fears as to social status and as to health. Man is beset by fears because of his memory mechanism, a mechanism that has made possible social and economic co-operation. This delicately poised social and economic relation is under constant strain. The driving force of fear and of its lesser form, worry, stimulates human beings to strivings, competitions, rivalries, and jealousies. The greatest and the most constant fear of man is fear of his fellow man. In the world of fears, worries, and anxieties, in which civilized man is engulfed, he fears just as the lower animals fear, largely in the physical terms of his ancestral fight or flight. In consequence, the racial action patterns tyrannize over the remainder of the organism, especially in those individuals who have developed their brains to the greatest degree.

Initiation of action is the function of the special senses and of memory. Although there may be no physical danger, yet, upon receiving an adequate stimulus, racial action patterns throw the switches for full steam ahead, activating the muscles, the adrenals, the thyroid, the heart, the metabolism and the respiration, inhibiting simultaneously the digestive and procreative systems, and as the result of these repeated inhibitions, among other results, indigestion, peptic ulcer and constipation may result. The incidence of peptic ulcer to which we have already referred is evidence of the validity of this reasoning. Other ulcers are constant; peptic ulcer appears in rhythms. Peptic ulcer has not only a rhythm related to the span of life, appearing more commonly in the active young adult period, but it also has a rhythm related to seasons of the year as it appears more often in the spring and autumn. It occurs more frequently in males, the incidence as compared to that in females being as seven to one. Peptic ulcer not only favours the human race and its most advanced members, it not only chooses for its incidence spring and autumn, and the active

period of life, but it is selective even in its victims, as its periods of activity correspond with periods of work, worry, and fatigue.

Peptic ulcer, indigestion, and constipation are aggravated by influences that cause an increase of activity of the sympathetic nervous system such as emotion and focal infection, and is mitigated by influences that lessen the activity of the sympathetic system such as relaxation and holidays. Peptic ulcer is mitigated by any diet or medication that diminishes or neutralizes the acidity and stabilizes the motility of the stomach.

From those considerations it is clear that peptic ulcer itself is an end result; that it is a symptom, and not a separate disease. It is an example of pathologic physiology, not of pathologic anatomy, and the energy or kinetic system of man is the mechanism which is involved in the pathologic physiology which produces a peptic ulcer.

It remains to consider how an ulcer of the stomach is established and maintained in the man in whom there is an over-stimulation of the kinetic system.

Edward Martin and Carlson have shown that the most probable mechanism is the production of a sphincterismus at the pylorus by changes in the activity of certain components of the autonomic nervous system. This sphincterismus causes a break in the perfectly balanced mechanism at the pylorus whereby a balanced acid-alkali relationship is established and the gastric juice, being thus deprived of the alkaline duodenal fluid, rises in acidity and coincidentally the motility of the stomach is greatly increased.

Manifestations of increased activity of the sympathetic nervous system are frequently noted in cases of peptic ulcer, such as increased perspiration, increased nervousness, a tendency to tachycardia, excessive motility, tenseness, excitability, short temper; in other words, many of the general symptoms of mild hyperthyroidism and of mild neurocirculatory asthenia.

Another interesting and significant fact is that the incidence of digestive disturbances in hyperthyroidism is higher than in the normal population. Furthermore, to the high-strung, high-capacity victims of peptic ulcer, as to those suffering from hyperthyroidism or neurocirculatory asthenia, a holiday affords almost a specific relief. These considerations would seem to strengthen the hyperkinetic or neurogenic theory regarding the aetiology of peptic ulcer.

If peptic ulcer is not a morphologic pathology due to exclusively local causes, but, on the contrary, is due to an excessive drive of the sympathetic system, then the administration of a drug, that would counteract the excessive action of the components of the autonomic system, would mitigate the pathologic physiology, namely, the spastic contraction at the pylorus, and relieve the symptoms. This is an established fact.

The seven biologic excitants of the adrenal-sympathetic system are pain, emotion, infection (foreign proteins), hæmorrhage, asphyxia (inhalation anaesthesia), thyroid hormone, and adrenaline. If the kinetic theory as to the causation of peptic ulcer is true, then emotional excitation, infection, pain, thyroid hormone, need be the only biologic excitants to be discussed in a clinical sense. Pain certainly aggravates a peptic ulcer. Emotion and physical exertion are closely related. Both aggravate peptic ulcer, and equally do the toxins of infection. This leaves the thyroid hormone to be discussed. The most outstanding physiologic action of the thyroid hormone is to step up the activity of the brain and the adrenal-sympathetic system, hence emotionalism, hence digestive disturbances. This factor, we believe, is clearly related to peptic ulcer, as we have noted 58 cases in which peptic ulcer has been associated with hyperthyroidism. In these cases thyroidectomy has been followed by a cure not only of the hyperthyroidism but also of the ulcer. Doubtless there were many undetected cases of peptic ulcer among our cases of hyperthyroidism, as x-ray examinations would have revealed, for in hyperthyroidism digestive disturbances

of every kind occur frequently and are taken for granted.

The above considerations offer the clue to the physiologic plan of management. The details vary with the personal equation and the inclination of the physician, and equally those of the patient. In many instances peptic ulcer can be rationalized out of existence. Happily, peptic ulcer passes by the more completely rationalized and controlled men and women who are occupying front line positions in civilization's forward march.

So much for the aetiology of peptic ulcer and other digestive disturbances. In view of this aetiology, what line of treatment is suggested?

The chemical damage due to the accumulation of the injuring gastric juice may be prevented by drawing off the highly acidulated gastric juice by a tube; equally is it prevented by emesis, by lavage, or by alkalies.

The sphincterismus may be relieved by demobilizing the kinetic drive of the brain by a holiday, by apoplexy, by softening of the brain, or by senility.

Although pyloroplasty and gastro-enterostomy, or alkalies, are followed by immediate relief, the patient still is in full possession of the pathologic physiology, which continues to work on its original plan—continues to exercise its pathologic action. For a time after pyloroplasty or gastro-enterostomy, the local sympathetic mechanism at the pylorus, as the result of an activation of which a peptic ulcer was produced, is not reconstructed; but, in time, after either a pyloroplasty or a gastro-enterostomy, the innervation is reconstructed, and, in certain and altogether too many cases, the continuous excessive drive re-establishes the pathologic physiology and the ulcer. This we call a recurrence, but it is a recurrence strictly and only of the ulcer. The pathologic physiology remains unchanged from the first.

This is not equally true of resection of the stomach, for this procedure so extensively destroys the stomach, that the pathologic drive is unable to fabricate an excess amount of ulcer-producing hydrochloric acid and pepsin.

The cases we have been considering are the active ulcers, which usually occur in younger subjects or in the hyperkinetic types of men. The picture is different in individuals of an older, more quiet temperament, and especially in patients in whom obstruction at the pylorus is present. These are mostly cases of healed ulcers. The surgeon in fact operates to relieve the serious complication of a healed, or at least an inactive, ulcer. On the fine results in such cases, much of the good repute of the surgical treatment of ulcer rests.

This brings us to the consideration of an operation devised for the purpose of changing the mechanism whereby the pathologic physiology is produced, an operation performed at a vulnerable point in the adrenal-sympathetic system.

If, as we have argued, this unique disease is due to a long-sustained over-activity of the adrenal-sympathetic system, then a surgical interference with this system should afford a measure of immediate relief and in a period of time a steady improvement, such as follows thyroidectomy in a case of hyperthyroidism.

When there is obstruction at the pylorus, we may assume that a healed or at least an inactive ulcer exists. In this case almost ideal results are secured by a simple gastro-enterostomy. When there is an active non-obstructive ulcer in an active, young, high-strung, worrying individual, then gastro-enterostomy is not indicated, because of the tendency to the formation of recurrent ulcers. Recurrences are more resistant to treatment than is the primary ulcer. The last state is worse than the first. In the case of a recurrent, intractable ulcer in a young individual with a high-strung, worrying temperament, we seek to change the pathologic physiology by denervation of the adrenal glands, otherwise gastric resection is the operation of choice. This procedure is comparable to that employed by Dr. W. M. Scott in surgery of the sympathetic nerves for the relief of mega-colon.

Clinical Trials with a New Antityphoid Serum

By A. FELIX, D.Sc.

(From the *Lancet*, Vol. I, 6th April, 1935, p. 799)

In experiments on mice, published in the *Lancet* last year, it was established that antityphoid sera containing O and Vi antibodies exert two separate and distinct effects, viz:—

(a) The Vi antibody confers protection against infection with highly virulent strains of *B. typhosus*, by suppressing the multiplication of the organisms.

(b) The O antibody appears to be chiefly responsible for effecting the neutralization of the endotoxin of *B. typhosus*.

It was concluded that the efficacy of a therapeutic antityphoid serum would depend on the presence in it of both these antibodies.

Thanks to facilities granted by the Colonial Office and by the Government of Palestine, I have had the opportunity of testing on a number of typhoid patients whether the two effects, established in prophylactic experiments in mice, are demonstrable also in therapeutic trials in man.

Antityphoid sera (nos. 1 and 2) from two horses were used in this investigation. They were prepared in collaboration with Dr. G. F. Petrie and his colleagues at the serum department of the Lister Institute at Elstree. In addition, the serum from a normal horse was used for the treatment of a number of control cases. The antibody content of the sera, determined by agglutination, and the results of protection tests in mice are shown in table I. The details of the mouse protection tests are omitted. The table only indicates

TABLE I

	ANTITYPHOID SERUM		Normal horse serum
	No. 1	No. 2	
Agglutination—			
O titre ..	20,000	40,000	200
Vi titre ..	400 + +	400 +	20 ±
Protection of mice—			
Against infection with live organisms.	+	+	—
Against the toxic effect of dead vaccine.	+	+	—

that the two antityphoid sera possessed both protective power against infection with live organisms and neutralizing power against the toxic effect of a dead vaccine of *B. typhosus*. Normal horse serum had no effect in either of these capacities.

NATURE OF THE TRIALS

The three sera were used unconcentrated and the standard dose for adult patients was 50 c.cm. administered by the intramuscular route. In severe to very severe cases this dose was given on three consecutive days—i.e., a total of 150 c.cm. of serum was injected intramuscularly. In cases of extreme severity (patients actually moribund or in a desperate condition) the serum was administered intravenously, again employing 50 c.cm. as the routine dose, which was repeated twice or three times at intervals of 24 hours, making a total of 150 c.cm. or 200 c.cm. per case. According to the history as regards previous serum treatment the intravenous injections were either given without particular precautions or the patients were desensitized by injecting first 0.1, 0.2 and 0.5 c.cm. at intervals of half an hour and then the full dose of 50 c.cm.

The total number of typhoid patients treated in Palestine during October and November of last year and the routes of administration of the serum are shown in table II. The table shows that most patients were

TABLE II

	PATIENTS TREATED WITH—	
	Antityphoid serum	Normal horse serum
Intramuscularly ..	32	14
Intravenously ..	10	3
Intrathecally ..	1	..
TOTAL ..	43	17
(Children below 14 years) ..	[6]	[3]

adults. Only 9 of the 60 patients were children below fourteen years. The dosage for children was according to the following scheme:

Children below 5 years ..	..	10 c.cm.
" 6—9 " ..	..	20 "
" 10—14 " ..	..	30 "
" over 15 " ..	..	* 50 "

* Full dose for adults.

It is further seen from the table that the number of control cases, treated with the normal horse serum, was much smaller than that of the patients treated with antityphoid serum. As soon as the difference between the results following the injections of the two types of serum became evident, the physicians in charge of the patients could not be induced to continue the use of the control serum.

The patients were not subjected to the treatment indiscriminately. They were selected with a view to excluding mild cases and those of moderate severity. The procedure was to class each case before the beginning of the serum treatment under the headings 'severity of toxemia' and 'severity of pyrexia', and from these two criteria the 'total severity' was derived. After the injections the 'effect on toxemia' and the 'effect on pyrexia' was assessed and recorded separately.

The great majority of the patients came from the Jaffa-Telaviv district where the incidence of typhoid fever was still high during October and November 1934. Table III gives the exact figures.

TABLE III

Locality	Hospital	Physicians in charge	PATIENTS TREATED WITH—	
			Antityphoid serum	Normal horse serum.
Jaffa	Govt. Hosp.	Dr. R. Reitler	25	9
Telaviv	Municipal Hosp., 'Hadassah'	Drs. M. Levontin and W. N. Wolff.	12	4
Jerusalem	Govt. Hosp.	Dr. N. Hamzeh	3	4
Do.	German Deaconess Hosp.	Dr. N. T. Canaan	3	0
TOTAL ..	..	..	43	17

Uniformity in classifying the cases with regard to their severity was assured by the fact that 50 patients out of a total of 60 were treated in two hospitals under the care of physicians with particular experience of typhoid fever. It was also facilitated by the fact that in most cases the serum treatment was begun during the second or third week of the illness with the symptoms of disease fully developed. The relevant data are recorded in table IV.

TABLE IV

Serum treatment commenced during—	PATIENTS TREATED WITH—	
	Antityphoid serum	Normal horse serum
First week	7	1
Second „	25	12
Third „	6	3
Later than third week ..	5	1
TOTAL ..	43	17

RESULTS

The results of the serum treatment observed in the 17 control cases can be dealt with very briefly. Following the intramuscular or intravenous injections of normal horse serum there was in no instance any change in the toxæmic symptoms of the patients. In some cases the fever was lowered, but this effect was only temporary, and after a few days the temperature rose again. The general condition of most of the patients treated with normal serum was rather worse than it had been before, and this caused the physicians to discontinue its use early in the course of the investigation.

The effects of the treatment with the two antityphoid sera, on the other hand, were quite different. To avoid reproduction of a considerable number of individual case-charts I have attempted to summarize the results in table V. It is seen that the series of 43 cases treated with antityphoid serum includes only 1 case classed as 'mild' and 9 of 'moderate severity', whereas 21 cases are designated as 'severe or very severe', and 12 as 'extremely severe'. The last group is composed of patients whose condition before the commencement of the serum treatment was considered as desperate or who were actually moribund.

TABLE V

Effects of treatment with antityphoid sera nos. 1 and 2

Clinical course	Cases treated	EFFECT ON—				Died
		Toxæmia		Pyrexia		
		+	—	+	—	
Mild ..	1	0	0	1	0	0
Moderately severe	9	3	0	6	3	0
Severe or very severe.	21	15	3	11	10	0
Extremely severe	12	6	6	5	7	5
TOTAL ..	43	24	9	23	20	5

It has been mentioned above that each case was classed separately under the headings 'severity of toxæmia' and 'severity of pyrexia', and that a 'total severity' was derived from these two criteria. For the sake of simplicity this 'total severity' alone is indicated in the first column of table V, whereas 'effect on toxæmia' and 'effect on pyrexia' are recorded separately. The symbol + denotes a marked favourable effect, and — indicates that there was no effect. In each subgroup the sum of the two figures recorded under the heading 'effect on pyrexia' is equal to the total number of cases treated. Under the heading 'effect on toxæmia', however, the sum of the two figures is, in the first three subgroups, smaller than the corresponding total number; the difference indicates the number of cases without marked toxic symptoms.

Table V shows that the effect on the toxic symptoms was stronger and more regular than that on the fever. Out of the total of 43 cases, 33 had definite toxic symptoms of varying degrees up to complete stupor and severest status typhosus. Of these 9 cases only remained uninfluenced by the serum treatment, whereas in 24 cases the toxic symptoms ceased, usually after the second or third dose of serum, and did not reappear. On the other hand, the fever was clearly shortened and definitely suppressed only in 23 cases, whereas 20 remained either entirely uninfluenced or showed merely temporary lowering of the fever, similar to that observed in the control group of cases treated with normal serum.

When the different subgroups in table V are considered separately, it is seen that with the increasing severity the numbers of failures increase under both headings. This finally led to the application of the intravenous route instead of the intramuscular injections which had been used throughout the greater part of the trial. The effect both on the toxæmic symptoms and on the fever was very much stronger following intravenous administration. However, it will be remembered from table II that only 10 of the 43 patients recorded in table V received intravenous injections, whereas 32 were treated by the intramuscular route.

To give an indication of the powerful antitoxic action of the immune serum it may be mentioned that in some instances two or three injections, given intramuscularly or intravenously at intervals of 24 hours, transformed a condition of complete unconsciousness into one of well-being. This effect was most striking in a number of patients whose toxic symptoms disappeared while the fever still continued unabated. The condition sharply contrasted with that observed in some of the patients of the control group, where the non-specific action of the normal serum resulted in a temporary lowering of the fever with the toxic symptoms left entirely undiminished.

It is not possible, without reproducing individual case-charts, to discuss the results in greater detail. The small number of cases treated also does not permit of any calculation of a reduction in the death rate or in the duration of the fever period. All that can be stated is that a number of patients were justifiably considered as having been saved by the serum treatment, while in a number of less gravely ill patients the fever period was considerably shortened.

Two unusual cases seem worthy of being mentioned specifically. Both patients were treated by Dr. R. Reitler at the Government Hospital, Jaffa.

A woman of 32 developed on the twenty-third day of her typhoid fever meningitic symptoms and severest status typhosus. Lumbar puncture revealed clear fluid under high pressure; 70 c.cm. of fluid was removed and 40 c.cm. of antityphoid serum injected intrathecally, and there was slight improvement. The same procedure was repeated 48 hours later and resulted in definite recovery. The patient was discharged from hospital 14 days after the second injection of serum.

The second case was one of perforation of a typhoid ulcer in a male patient of 20, who left his bed in a semi-conscious condition on the fourteenth day of the

disease. Dr. W. E. Thompson, surgeon specialist to the Department of Health, Jerusalem, operated on the patient about 18 hours after the perforation had occurred and administered 80 c.cm. of antityphoid serum directly into the peritoneum. The patient also received 50 c.cm. of the serum by the intramuscular route. He recovered, and the surgeon attributed this to the effect of the serum treatment.

There can be little doubt that the antitoxic activity of the serum is due to the O antibody. The serum no. 2 (see table I) with an O titre of 1 in 40,000 acted more strongly on the toxic symptoms than the serum no. 1 with an O titre of 1 in 20,000. To what extent the suppression of the fever is to be attributed to the action of the Vi antibody cannot be answered from the present trial, since there was no control group of cases treated with a serum containing O antibody alone. Assuming that pyrexia is an expression of the multiplication of the invading organisms with consequent production of toxin, we would conclude from the protection experiments in mice with Vi antibody alone that the effect of the latter in suppressing invasion would be most clearly manifested by the degree of fever in the earlier stages of enteric and in relapses. The earlier therefore the case comes under treatment the greater should be the opportunity for the Vi antibody to exercise the invasion-suppressing function so clearly exhibited in the mouse experiments. It is proposed in future clinical trials to compare a pure anti-O serum with the serum we have been discussing, containing both O and Vi antibodies.

However, the main object of the present investigation was to establish in therapeutic trials in man whether or not some action on the toxic symptoms and on the fever was exercised by the antityphoid serum. It would appear that the answer to this question is in the affirmative.

Aural Complications of Influenza

By JOHN F. O'MALLEY, F.R.C.S.

(Abstracted from the *Medical Press and Circular*, 27th March, 1935, Vol. CXV, p. 303)

Every outbreak of influenza is responsible for a certain proportion of aural complications, ranging in severity from a simple inflammation of the Eustachian tube or middle ear, to suppuration of the latter, a mastoiditis, or even a lateral sinus thrombosis. One sometimes wonders that the incidence is not much greater when we come to consider the intimate physiological relationship which exists between all the air cavities that open into the upper respiratory tract.

It will be profitable here to make a brief digression to examine some of these activities, to enable us to understand more readily how the health is maintained and why the intrusion of an acute inflammatory infection is bound by its reactions to impair this; and, further, it will make the principle which should underlie treatment appear more obvious and logical.

The middle-ear cavity is an air space, functioning most of its time at atmospheric pressure level, and subject to the entrance and withdrawal of air through the Eustachian tube. This air movement does not synchronize with every respiratory act of the nose and lungs, as it does, for instance, in the maxillary and other accessory sinuses, because we find that the pressure of air in the antrum and nose is lower than that of the atmosphere during inspiration, and higher on expiration. During the act of swallowing the air pressure in the pharynx can be shown to be at the atmospheric level, and every performance of this act partially opens the Eustachian tube, whose V-shaped orifice is directed downwards (possibly purposeful), and thus an equal pressure on both sides of the tympanic membrane can be easily maintained. Attempts at

inspiration with the anterior nares occluded withdraw air from the middle-ear cavity, reducing the pressure inside the membrane below that of the atmosphere on its outer surface. Attempts at expiration under similar conditions will increase the pressure in the tympanum above that of the atmosphere. The exercise of the latter procedure, as applied to treatment, is known as the 'method of Valsalva', and the same principle underlies the method known as 'politzerization'.

I must not delay here to dwell on the activity of cilia, mucin, and other secretory functions, air humidification, etc., all of which may be comprehensively regarded as a mechanism provided for the purification and sterilization of the air which enters the nose and sinuses before it passes for oxygenation to the lungs, further than to state that this appears to be carried on efficiently, so long as the varying air-pressure movements mentioned above remain possible. These movements I have referred to elsewhere under the term 'ventilation'.

Bearing this in mind, it will now become obvious that the invasion of the upper airway by an infective inflammatory process with its reactions, and especially if of the type seen during epidemics of influenza, must very seriously, if not at times completely, impair these ventilation movements, and it is thus that the middle-ear cavity may become involved.

Some confusion may arise in the reader's mind when he studies so many apparently isolated phenomena as presented in the literature on air-cavity infections, unless he understands the principle which underlies their ventilation. I would like therefore to emphasize the fact that there is no peculiar mystery about the biological phenomena of inflammation in the nose and its adjoining air spaces, when compared with those seen in any solid organ or hollow viscus of the body, because they are essentially identical and go through the same phases of development and resolution or suppuration; but its reactions here assume a special character, which is entirely conditioned by their power or not to maintain their allotted air function in the respiratory tract.

Following inflammatory subsidence, the normal type of nose is rapidly restored to its relative air patency owing to the establishment of its through-and-through ventilation currents, causing the removal of all gross exudates, but this desirable result is not so easily obtained in recessed cavities.

The Eustachian tube projects somewhat like a nipple into the nasopharynx with its V-shaped orifice downwards, an anatomical arrangement which possibly protects its lumen in some measure from the spread of inflammation by continuity, but it is liable to get infected by a 'droplet method' with any violent expiratory efforts, such as sneezing in the earlier part of an influenza attack, or, later, from blowing the nose in the exudative stage of the nasal inflammation.

The middle-ear space regarded as a recessed air cavity, removed from the common respiratory tract by a long narrow channel (especially in the adult), and only intermittently in air continuity with it, derives from this anatomical design a considerable measure of protection against air-borne infections, which possibly explains why it escapes many of the simpler invasions of the upper airway, and is only involved by some of the more virulent.

But once invaded by a severe inflammatory process, which fully develops to an exudative stage, the protective design against the entrance of infection becomes now a source of embarrassment, preventing free ventilation, and with it the removal of secretions, so that yielding of the tympanic membrane to the pressure of these exudates, or their release by surgical means, becomes the only safety valve for their escape. The middle ear may be infected almost simultaneously with that of the upper airway, but, as I have pointed

out elsewhere, it is more prone to occur later in the attack, when free exudates are present in the nose, and the patient tries to remove them by forced expiratory efforts.

I have personally seen some cases where the ear complications were very severe, if the infection began early or co-incidental with the influenzal attack, as contrasted with some which arose at a later stage. Possibly in the latter the nasal attack had already conferred some immunity, which raised the resistance in the middle ear.

Remarks.—Apart from influenzal infections, a primary acute middle-ear suppuration is rare in adults. Its incidence in childhood and adolescence is considerable, and the tendency to extensions beyond the middle ear equally so. This incidence, however, is not so great in my experience, as that accompanying the exanthemata; but the contrary is true of adults, the possible explanation of this being the presence of adenoids in children and their absence with a well ventilated nose in the adult. It is also noteworthy that persons who have frank intra-nasal suppurations, such as ethmoiditis or atrophic rhinitis, are apparently less prone to acute otitis media during these epidemics than those with previously clean noses. It is thought that a localized tissue immunity has resulted here from the chronic sepsis.

Symptoms.—These are necessarily general and local: the former, such as pyrexia, increase of pulse rate and malaise, arise from a systemic reaction to inflammation in the common upper respiratory tract, and now extending to, or present in, one of its adjoining spaces. The local symptoms naturally involve impairment of ear function. Pain is an outstanding symptom, due to engorgement of the lining in a limited air space, and this is accompanied by increasing deafness and pyrexia. As the case progresses towards suppuration, inflammatory exudates tend to accumulate in the cavity, and as no escape is now possible through a swollen Eustachian tube, distension takes place at the expense of the only mobile wall, the tympanic membrane, and so the pain increases, and may become excruciating. It is boring and throbbing in character, the throbs corresponding to the heart beats.

An early hæmorrhagic discharge, which is in reality a blood-stained serum, occurring with the onset of earache, is almost pathognomonic of an influenzal infection of the *Streptococcus hæmolyticus* type. This is not, however, any evidence of a perforation of the drum.

Treatment.—This should be general and local. Every available means of abating the severity and duration of the inflammatory attack should be resorted to, in the hope of limiting its extension and possible complications. Bed and an equable room temperature are of the first importance to soothe the invaded respiratory tract.

Free perspiration for twenty-four to forty-eight hours is invaluable, the merits of which I have frequently tested. The vaso-dilatation associated with this relieves the inflammatory tension and pain, and promotes sleep and the elimination of toxins. The arms should be kept under the bedclothes. A preliminary bath, as hot as bearable, for two or three minutes will cause cutaneous redness and start vaso-dilatation. This action is aided by an occasional dose of such drugs as aspirin and soda salicyl. with a fairly abundant intake of fluids, and either warm or cold water, as the patient may fancy. Underclothing which does not chill the skin when wet, and which can be changed safely when it is so, is essential if this method is adopted, and for this reason wool or a large admixture of it is indicated. Free action of the bowels is desirable. Start with calomel, gr. $\frac{1}{3}$, at night, followed by a saline next morning.

An injection of 10 cubic centimetres of anti-scarlet fever serum (concentrated streptococcus anti-toxin, scarlatina. B. W. & Co.) early in the attack exercises a beneficial influence over its progress. I am more favourably impressed by its action than that of S. U. P., which I

used formerly. Another 10 cubic centimetres can be given in twenty-four hours.

Local treatment of the nose and ear.—I am averse to any liquid treatment of the nose or airway in the acute stage. Steam vapours, medicated with tincture benzoin compound or menthol, may be inhaled, and are soothing. Wearing a light gauze mask over the nose and mouth for a great part of the twenty-four hours is very comforting, as it allays the tendency to sneezing and coughing, and therefore has the further advantage of limiting the dissemination of infection. In the early stage of earache with slight deafness and pyrexia, and only redness of the membrane, expectant treatment may prove effective, as many such cases arise which never proceed beyond this phase, but which if surgically incised must suppurate, no matter how aseptically the operation is performed.

Two or three per cent of glycerine acid carbolic dropped twice daily into the ear renders the meatal passage is a condition to be desired in the event of a sudden or unexpected perforation of the membrane occurring, or surgical incision of it becoming necessary.

If the pain, deafness and pyrexia continue or increase the case is now passing to the exudative stage, and will end in suppuration. An examination of the membrane by anyone possessing the necessary skill and experience will reveal œdema and bulging. If these are present, release of tension by surgical means is indicated. Spontaneous perforation or simple puncture will answer the physiological needs for the relief of tension and pain, but they may fail to permit a sufficiently free escape of the inflammatory products, which is essential to the quick return of the cavity to its air-containing function.

A long of the membrane is being then high in gauze, left in for two days, to be followed by the daily introduction of boric powder iodized to 1 per cent. Avoid damming up the external meatus, and the return of middle-ear ventilation via the Eustachian will soon prove an effective factor in drainage.

Favourite Prescriptions: The Pharmacopœia of the Middlesex Hospital

By E. A. COCKAYNE, D.M., F.R.C.P.

(Abstracted from the *Practitioner*, Vol. CXXXIV, May 1935, p. 685)

Among the formulæ for general use there are a number of *aperients*, but only one differs appreciably from those to be found in the pharmacopœias of other large hospitals. This is the emulsion of liquid paraffin which, owing to the reduced content of gum, is much thinner than most emulsions of paraffin and is therefore easier to dispense and more pleasant to drink. It acts well and patients do not complain of the leakage of oil, which is so often troublesome when pure paraffin is taken.

R Paraffini liquidi	..	..	4 fluid ounce
Pulveris acaciæ	..	..	20 grains
Sodii benzonitis	..	..	1 grain
Sodii chloridi	..	..	1 "
Vanillini	..	..	1/80 "
Glusidi	..	..	1/80 "
Aquam ad	..	..	1 fluid ounce

Formulæ for diseases of the alimentary tract.—One of the prescriptions most frequently dispensed to out-patients is the alkaline gentian mixture:—

R Sodii bicarbonatis	..	..	10 grains
Tincturæ zingiberis mitis	..	..	10 minims
Tincturæ rhei compositæ	..	..	3 "
Spiritus chloroformi	..	..	5 "
Infusum gentianæ ad	..	..	1 fluid ounce

Another popular mixture designed for the treatment of flatulent dyspepsia has remained unchanged for at least thirty years:—

R Sodii bicarbonatis ..	10 grains
Spiritus ammoniæ aromatici ..	20 minims
Spiritus chloroformi ..	10 "
Infusum caryophylli recens ad ..	1 fluid ounce

The modern treatment of peptic ulcer by means of large doses of alkalis is reflected by the presence of two powders containing the light and heavy carbonates of magnesium and chalk, but in different proportions. The old powder containing bismuth and the carbonates of magnesium has been retained and the following new one has been added:—

R Kaolini ..	20 grains
Magnesi carbonatis levis ..	20 "
Magnesi carbonatis ponderosi ..	20 "

The kaolin is not only cheaper, but probably has an additional value as an absorbent of toxins.

The *Haustus cretæ* compound of 1899 is now made up with chloroform water instead of distilled water, and is as follows:—

R Cretæ preparatæ ..	15 grains
Mucilaginis acaciæ ..	60 minims
Tincturæ catechu ..	20 "
Aquam chloroformi ad ..	1 fluid ounce

It is a useful formula for diarrhoea.

Both valerian and asafoetida are reputed to be carminatives, but the continued presence in the pharmacopœia of a mixture containing both of them is due rather to their nauseous taste than to their pharmacological action. The mixture is retained to satisfy the patients who think that the stronger the smell and the more unpleasant the taste, the greater must be the efficacy of a medicine. Its value is considerable, if it is used with discretion, and, strangely enough, it is popular with the patients.

R Tincturæ valerianæ ammoniatæ ..	20 minims
Tincturæ asafoetidæ ..	20 "
Infusum quassia recens ad ..	1 fluid ounce

Cough mixtures.—The *Haustus ipecacuanhæ* cum ammonia has its counterpart in most hospital pharmacopœias and is a useful expectorant mixture, while the *Haustus ipecacuanhæ* compound is both sedative and expectorant. Though its ingredients might be thought to neutralize each other, the clinical experience of more than one generation of physicians has proved its value. It is given for acute bronchitis and is as follows:—

R Tincturæ ipecacuanhæ ..	10 minims
Tincturæ opii camphoratæ ..	30 "
Liquoris ammonii acetatis fortis ..	30 "
Aquam ad ..	1 fluid ounce

For the early stage of acute bronchitis, when there is congestion of the mucous membrane and the cough is dry, the mixture which was added to the pharmacopœia on the recommendation of the late Sir James Kingston Fowler, the *Haustus sodii chloridi* compound, sometimes gives relief. It is as follows:—

R Sodii chloridi ..	5 grains
Sodii bicarbonatis ..	5 "
Spiritus chloroformi ..	5 minims
Aquam cari ad ..	1 fluid ounce

A useful expectorant mixture for chronic bronchitis is the *Haustus senegæ* compound:—

R Ammonii carbonatis ..	3 grains
Tincturæ scillæ ..	20 minims
Olei pimentæ ..	1 minim
Spiritus chloroformi ..	10 minims
Infusum senegæ recens ad ..	1 fluid ounce

The fresh infusion prevents the formation of a deposit in the mixture.

The *Haustus potassii iodidi cum stramonio* is designed for the treatment of asthmatic patients in the intervals between their attacks or in chronic bronchitis, when the cough is spasmodic. It contains:—

R Potassii iodidi ..	3 grains
Tincturæ stramonii ..	15 minims
Extracti glycyrrhizæ liquidi ..	20 "
Aquam chloroformi ad ..	1 fluid ounce

In asthma the amount of stramonium should be increased until it causes dryness of the mouth, and then reduced, until this effect is no longer troublesome, and this, which is the optimum dose for the individual, should be continued. Though the mixture has been dispensed unofficially for a long time, it appeared officially for the first time in the 1933 edition.

For an irritating cough there is the *Linctus pectoralis*, which is similar in composition to Ger's linctus, a preparation often dispensed, but never incorporated in the pharmacopœia. The formula for the *Linctus pectoralis* is:—

R Oxymellis scillæ ..	10 minims
Tincturæ opii camphoratæ ..	10 "
Spiritus ætheris nitrosi ..	5 "
Aquam ad ..	60 "

Urinary antiseptics and diuretics.—The usual mixture containing both hexamine and acid sodium phosphate, which is in use in most of the large hospitals, is unsatisfactory owing to its gradual decomposition with the liberation of formaldehyde. The Middlesex is one of the few hospitals which dispenses the two chief ingredients separately with the direction that half an ounce of each solution should be mixed immediately before being taken:—

R Hexaminæ ..	10 grains
Tincturæ hyoscyami ..	30 minims
Infusum buchu recens ad ..	1 fluid ounce

R Sodii phosphatis acidii ..	20 grains
Infusum buchu recens ad ..	1 fluid ounce

For pyelitis there is a mixture containing 30 grains of potassium citrate, a more alkaline mixture made by the addition of 30 grains of sodium bicarbonate, and a third to which 30 minims of tincture of hyoscyamus has been added for use, when pain is severe.

There are no formulae containing a diuretic acting directly on the renal cells, though prescriptions with one or other of them as an ingredient are in regular use. It is with regret that one notices the omission of the old *Haustus scoparii* from the 1933 edition:—

R Potassii acetatis ..	20 grains
Tincturæ scillæ ..	10 minims
Spiritus ætheris nitrosi ..	30 "
Infusum scoparii ad ..	1 fluid ounce

It sometimes gave satisfactory results, when the remedies in commoner use had failed, but its already limited sphere of usefulness has been encroached upon by the newer and more active proprietary compounds of mercury, such as salyrgan.

Medicines for special diseases.—When gout was still common there was a *Haustus potassii iodidi cum colchico*, but this was omitted in the edition of 1915. In the last edition a new prescription has been introduced without potassium iodide and with the tincture instead of the obsolete vinum colchici. This is:—

R Tincturæ colchici ..	10 minims
Potassii citratis ..	20 grains
Magnesi sulphatis ..	20 "
Infusum buchu recens ad ..	1 fluid ounce

Another disease the incidence of which has changed very greatly since 1915 is encephalitis lethargica. This became common in 1918, and a prescription has been

inserted in the last edition for the treatment of its sequelæ.

R Hyoscine hydrobromidii	..	1/100 grain
Tincturæ lavandulæ compositæ	..	5 minims
Aquam chloroformi ad	..	1 fluid ounce

The modern treatment of thyrotoxicosis has led to the addition of *Haustus iodi*, which contains 0.06 gramme of free iodine in each ounce:—

R Liquoris iodi mitis	..	41½ minims
Aquam ad	..	1 fluid ounce

This preparation, which, unlike the more familiar Lugol's solution, contains no potassium iodide, is most often used for preparing patients for partial thyroidectomy, and its effects are determined by estimations of the basal metabolic rate.

Recent work has proved that much larger doses of iron are often needed for the cure of anæmias than were formerly considered to be necessary, and this is particularly true of the hypochromic microcytic anæmias of middle-aged women. This change of practice has induced the compilers of the pharmacopœia to increase the strength of the *Haustus ferri et ammonii citratis*, and it now contains 20 grains of iron and ammonium citrate instead of 5 grains to the ounce, a dose which had remained unchanged for more than 30 years.

One more preparation from the general formulæ may be selected for mention. The *Collutorium phenolis cum iodo* is a valuable antiseptic mouth wash for use after the extraction of teeth:—

R Phenolis liquefacti	..	30 minims
Liquoris iodi mitis	..	15 "
Aquam ad	..	1 fluid ounce

One teaspoonful to half a tumblerful of water.

The special departments have their own preparations, those for the Children's Department being called *misturæ* to distinguish them from the *Haustus*. Although their number has been increased greatly in the last two editions, most of the old formulæ have been discarded and the new ones have been borrowed from sources outside the hospital.

From the preparations in use in the Ear, Nose, and Throat Department, the *Nebula camphoræ composita* may be selected for mention:—

R Camphoræ	..	3 grains
Mentholi	..	3 "
Guaiacoli	..	3 minims
Olei cinnamoni	..	1 minim
Paraffinum liquidum ad	..	1 fluid ounce

This makes an agreeable nasal spray and used for many inflammatory conditions of the nose.

The Eye Department has a large number of formulæ from which two are selected. The *Oculentum ichthammolis cum zinci oxido*:—

R Ichthammolis	..	1 per cent
Zinci oxidi	..	15 "
Paraffinum molle flavum ad	..	100 "

For chronic blepharitis; and the *Guttæ hyoscine*:—

R Hyoscine hydrobromidi	..	0.25 per cent
Chlorbutolis	..	0.3 "
Aquam distillatum ad	..	100 "

a mydriatic used when atropin causes irritation. The addition of chlorbutol makes this superior to the hyoscine drops in use at some of the other large hospitals.

From the formulæ for use in the Skin Department it is difficult to single out one more worthy of mention than another. The value of magnesium sulphate for the treatment of boils has been recognized officially, and the *Pasta magnesi sulphatis* has been included for the first time in the 1933 edition:—

R Magnesi sulphatis exsiccati	..	360 grains
Glycerini	..	180 minims

Bacillary Dysentery: A Summary of Treatment With Brief Statistics of an Epidemic

By H. W. CORNER, M.D.

(Abstracted from the *British Medical Journal*, Vol. I, 8th June, 1935, p. 1162)

THEORETICAL CONSIDERATIONS

THE toxæmia, and the orderly sequence in clinical events following infection, serve to distinguish bacillary dysentery from the many miscellaneous causes of this unpleasant symptom. When an exotoxin is present, as with the Shiga bacillus, the effect appears early and is severe. The amœbic disease has none of these general features. It may acquire high endemicity, but cannot become epidemic. The morbid process differs, and the course of disease is necessarily distinct.

The degree of severity in bacillary dysentery is the basis of clinical classification, the disease being either (1) mild, (2) severe, or (3) fulminating (choleraic): serum treatment is indicated in all except the mild cases. Clinical judgment depends on a recognition of underlying mechanisms. For example, in the Shiga infection there is early histotoxic anoxæmia, often manifest in the patient as a peculiar bluish flush, and giving way sooner or later to pallor. There is loss of tone in capillary and vasomotor areas, and a resulting fall in blood pressure. The signs denoting severity are those of imminent collapse, and are in terms of the circulatory system; they are not of the arresting nature of tenesmus or of strangury, and need not occur in proportion to the degree of fever or the frequency of stool. Bacillary dysentery is more than 'an abdominal disease'. It is for this reason that many cases which begin mildly become later severe or fatal.

Early exhaustion, which is due to toxæmia, is amenable to treatment, and certain drugs are of some value. Late exhaustion results from tissue depletion. It is less amenable to treatment, and all drugs are useless. It should not, however, be considered an inevitable and vague state of dissolution. To toxæmia is added deprivation and loss of most of the pabulum out of which biochemical balance is effected. The mechanism of the syncope is that of peripheral circulatory failure. The principles of treatment are therefore as follows: improvement of tissue nutrition; increase of blood volume in terms of venous return; conservation of body fluids and of body heat; and conservation of energy, especially in the posture and effort of defæcation, or in the distress of incontinence.

Necrosis or ulceration of the colon is a lesion entailing certain difficulties in treatment. The necrosis is superficial, but cellular reaction in the underlying layers may be severe. In the peritoneum this reaction is usually negligible, but occasionally may be severe enough to cause death. There is general thickening of the bowel—often from cæcum to rectum—into the semblance of a tube of chewed leather, lined by dark green blood-and-bile-stained shaggy coagulum. This is a lesion for which it is useless to continue pouring down salines by mouth. The position should be considered. The bowel, upper and lower, has been emptied by an initial purge, serum has been administered, and toxæmia is therefore no longer a danger. The patient's diet has for several days consisted of fluids. The over-persistent use of salines will now cause elimination or excretion of nothing but valuable nutritive fluid, will aggravate hypotension, and will precipitate collapse. Even the injunction 'salines four-hourly till the stools become fæculent' may be dangerous advice.

It would be unwise, moreover, to attempt per-rectal irrigation of the ulcerated area with antiseptic solutions of a strength whereby absorption would be toxic, or of a nature whereby too astringent an effect would be equally undesirable. Local administration of such solution can produce harm more readily than good. The sole purpose of irrigation should be the removal of

irritation from debris accumulated within the lumen of the bowel or on the surface of the lesion.

TREATMENT IN PRACTICE

The castor oil and opium purge is a sound preliminary, but is unsuitable for patients who, when first seen, have already spent two or more miserable days of diarrhoea. It is a special benefit when there is more early colic than early diarrhoea. It is too valuable to be omitted just because the laboratory requires specimens without oil; specimens can always be had before the oil is given.

USE OF SERUM

Given early, serum is the most effective single therapeutic measure in this disease. It should be given promptly in every severe case of epidemic dysentery without waiting for bacteriological reports on cultures. Specimens are plentiful. Macroscopic and microscopical examination of faeces should be done as part of the 'condition on admission'. There is sufficient evidence at hand for immediate decision. Exactitude of dosage and route of administration matter less than that the serum should be given promptly. The initial dose should be 40 to 80 c.c.m., repeated if necessary on the following day. The intramuscular route is the method of preference.

It is well to remember that bacillary dysentery is a disease 'at first worse than it seems and later as bad as it looks'. There is a type of patient who suffers quietly and uncomplainingly for a few days, and subsequently becomes alarmingly collapsed during a period of relaxed observation. Pallor, frequent and small-volume pulse, and systolic blood pressure under 90 mm. Hg. are then discovered for the first time. It is the management of this type of case that often decides whether the mortality figure for an epidemic is to be high or low. It might be said that the very worst cases succumb in spite of treatment; the very mild cases recover irrespective of treatment; the cases initially severe receive prompt treatment and so recover; but the cases beginning in a mild way and later becoming severe miss the benefit of early serum and so tend to run a more precarious course.

Concerning the customary guides to severity—namely, fever and frequency of defaecation—three things should be kept in mind. (a) That the time of examination may happen to be at any point in the rapid sequence of fever (subnormal \rightarrow continued \rightarrow remittent \rightarrow irregular \rightarrow normal), or in a similar and roughly corresponding sequence in the stools (diarrhoeal \rightarrow mucosanguineous \rightarrow 'ulcerative type' \rightarrow sanguino-faeculent \rightarrow semi-formed). (b) Although the above order is usual in Shiga infection there may be any variation. (c) In the worst type of case the patient has neither fever nor time for defaecation.

The serum is antibacterial as well as antitoxic. It is perhaps for this reason, or because of the benefit accruing from the globulins, that serum given late in the disease, though less effective than when given early, nevertheless produces undoubted improvement. Such use, however, implies a failure in early diagnosis or a failure in the estimation of degree of severity.

Bacteriophage has much in the nature of its inception to justify great expectations in dysentery. Nevertheless its failure is such that its use in treatment may amount to dangerous experiment. It proscribes the use of serum, and suspends other treatment with no appreciable benefit and with the risk that such omission entails. With its *in vitro* success and its *in vivo* failure this substance would appear to have been introduced prematurely into therapeutics.

SALINES AND DIET

Sodium sulphate in mixture (5 j to fl. \bar{x} j) is stock treatment, but the routine scheme should be varied for the individual. When an initial purge has been given,

one ounce of the mixture should be administered two-hourly for one day, four-hourly for the next two or three days, and then dropped, as soon as possible, to a single early morning dose. When no initial purge is given, hourly doses for eight hours can be used during the first day, two-hourly the second day, four-hourly on the day following, and can be suitably tapered off. There can be no fixed rule; pulse, blood pressure, nature of stool—all have to be considered.

Diet is all-important. The dictum 'fluids and plenty of them' refers not to the diet itself but to the simple flavoured drink which should be present in a jug by the bedside and duly replenished. Milk should never be given, either fresh, diluted, or disguised, for it induces colic and an aggravation of abdominal symptoms. Occasional ice-cream has no contra-indication. Chicken tea, arrowroot, beef tea, and ... mentioned in the order in which ... of value, and, incidentally, in the patient's order of preference. The laxative effect of meat extracts is to be remembered. Rigorous mouth hygiene is important, and chewing gum is both useful and comforting.

This two-hourly dietary, varied suitably but not over-stepped, serves to tide the patient over his initial toxæmia, but it should not be prolonged unnecessarily. There should be a gradual increase to custard; tea, with an egg and thin bread-and-butter; steamed fish; minced chicken; milk puddings (except rice); and mashed potato. There will be intolerance of certain foods or temporary discomfort following others, but these are not signs for a return to fluids. Likewise it is well to note, but not to be alarmed at, some traces of blood reappearing in the stools.

The diet in late marasmus requires separate consideration. Here the emaciation is extreme. The body weight of an adult male may drop under 4 stone. The patient's appearance may suggest a skeleton or a shadow, and is a spectacle of the horror of disease. There is fretful childishness as well as pitiful enfeeblement. This is a condition requiring light but highly nutritious diet of a wide range, with vitamin preparations given with a definite purpose in view and not haphazard. A nursing staff with infinite patience and a tactful cajolery is as necessary as a suitable diet. A remarkable feature of this condition is the degree of emaciation and the duration of this precarious vegetative state that is compatible with complete recovery.

RELIEF OF PAIN

This is a necessity in every case. In the treatment of this disease there is no place for morphine. Opium itself, however, in the form of the tincture, has its limited use at first with the purge, and occasionally later, but before exhaustion sets in. Hypodermic preparations of the total alkaloids of opium do not appear to have all the dangers of morphine alone, and, suitably restricted, are permissible in emergency. The pain of tenesmus may be relieved by hot water rectal irrigation. Anal pain is relieved by atropine in suppository. Prolapse and hemorrhoids, old and recent, are temporarily relieved by local bathing with hot water, thorough drying, and subsequent application of the non-aqueous calamine cream to the skin. The pain of strangury is relieved by belladonna in alkaline mixture in suitably large doses. The general abdominal discomfort is made easier, when practicable, by radiant heat. The pain of iritis will be mentioned later.

INTRAVENOUS MEDICATION

This is called for in every severe case. It is used early in toxæmia for serum, when the necessity for the latter would appear too urgent for intramuscular injection, and early in exhaustion for 5 per cent glucose in normal saline. The time-indication for glucose in saline is important. If left too late the therapeutic opportunity is lost. Moreover, venous collapse is not just a

There are then three extremely useful chapters on the principles and practice of hæmatological diagnosis; in these technique is not included, but a separate chapter of about 50 pages is devoted to this subject and is suitably placed at the end of the book. This chapter on technique enhances the value of the book very considerably. Again the exigencies of space have limited its scope, but the authors have described one useful and accurate method for each procedure. We note that they suggest placing the thumb over the opening of the Sahli hæmoglobin tube and inverting it; this is a method often followed in practice but it is one that must decrease the accuracy of the estimation.

In the chapter on the causes of anæmia a very reasonable classification is given. The writers have of course departed from the old classification of primary and secondary anæmias and have adopted one dependent on ætiology; their four main groups are, dys hæmopoietic anæmias, hæmolytic, hæmorrhagic, and anæmias of unknown cause. They have not, however, given any table of classification—perhaps they think this would be a little premature in our present state of knowledge—nor do they follow this classification in their subsequent division of the subject into chapters.

Blood diseases themselves are considered in twelve chapters which form the main bulk of the book. The writers are fully conscious, even if they have not referred to each worker individually, of all the recent work on this extensive subject and there are numerous references to papers published in 1935. These chapters will be found equally valuable to the student who wishes to read up the subject from 'a to z' and to the physician who wishes to look up any particular point that has arisen in his practice, as the chapter, section and paragraph headings are well conceived and there is a useful subject index.

At this point we must come to our quarrel with this otherwise most excellent book. We do not understand why the chapter 'Infection and Infectious Diseases' ever found its way into the book. To give concise details of some of the characteristic blood changes that occur in various infectious diseases was sound enough and this is apparently what the writers started out to do; they were successful up to a point, but then for some unaccountable reason they seemed to have been lured into giving short accounts, containing little reference to the blood picture, of a number of tropical diseases, about which they obviously know very little. In the three pages devoted to leishmaniasis they have managed to cram an incredible number of naïve, irrelevant and misleading statements. One is told that 'the organism resembles the degenerating forms of certain trypanosomes', that it has two nuclei of different size and that the larger may be bi-lobed, that kala-azar occurs in nearly all parts of India, that when doing a spleen or liver puncture one's object should be to draw 'lymph' and to avoid blood, a Portian warning that would shake the nerve of any modern Shylock, even if he did happen to know where he could expect to find 'lymph' in a liver or a spleen.

There is one other chapter that we should mention, that on blood grouping and blood transfusion technique. This is short, but gives the essentials, and will be very useful to the practitioner, as hitherto he has had to refer to one of the larger books on laboratory technique for the former and to a book on surgical technique for the latter.

At the end of each chapter is a short list of references that the reader will find very useful indeed, and there are some excellent coloured plates. The whole book forms an extremely valuable contribution to the subject of blood diseases and will be welcomed alike by the clinician, the laboratory worker, and the medical investigator. The format of the book is of the high class that we have been led to expect from this well-known firm of medical publishers. It is a book that we can thoroughly recommend to medical readers of every class.

L. E. N.

A TREATISE ON HYGIENE AND PUBLIC HEALTH—WITH SPECIAL REFERENCE TO THE TROPICS.—

By B. N. Ghosh, F.R.F.P. & S. (Glas.). Revised and largely rewritten with the assistance of A. D. Stewart, C.I.E., M.B., F.R.C.S.E., D.P.H., D.T.M. & H., Lieut.-Col., I.M.S. Eighth Edition. 1935. Scientific Publishing Company, Calcutta, India. Pp. xv plus 660, with 163 illustrations. Price, Rs. 7-8

The eighth edition of the *Treatise on Hygiene and Public Health* by Birendra Nath Ghosh appears within 24 years of the first publication of the work under the joint authorship of Ghosh and Das. The author has been fortunate in getting the valuable help of Colonel A. D. Stewart in the general revision of this edition and the help of Colonel Covell, Dr. E. Muir, Dr. Keshava Pai and Dr. K. V. Krishnan in revising special sections of the book. The book is a store of information on public health subjects and is alive to the special needs of the students in the tropics. Treatment of the subjects is on the whole lucid and the treatise has kept abreast of the latest work. The book is deservedly popular with students and public health workers and the desire to see it free of blemishes prompts the reviewer to draw attention to the following which appeared to him to be either inaccurate or inexplicit, when reading through certain sections of the book.

(1) In the description of the chemical and bacteriological tests of water (are these not rather out of place in a book of this type?) on page 61, the definition of typical *B. coli* should be amplified; on the same page under total colony count the statement 'this gives the total number of bacteria of all kinds in the sample' is incorrect.

Under *B. coli* count on page 62 in the instruction on the seeding of water, 10 c.cm. quantities are skipped over and too many 20 c.cms. find place; on the same page we are told that the varieties of *B. coli* are separated into four groups by their reaction on saccharose and dulcitol, the particular classification referred to should have been stated.

The term faecal bacilli frequently crops up but it is not used in the same sense as is done in present-day bacteriology.

(2) The seeds of mustard grown in Bengal from which mustard oil is pressed out are—

Brassica Napus (var. *Dichotoma*)—(Indian rape),

Brassica Campestris—(Indian Colza), and

Brassica Juncea (not *Junce*)—(Rai),

and there exist many more species which are not grown in this province.

The statement on page 227 that there are three varieties of mustard seeds should therefore be corrected and modified. We miss linseed oil among the common adulterants of mustard oil.

In the section on preventable diseases, under plague, some of the characters of *Pasteurella pestis* described appear to be redundant; on page 477 'it has remarkable power against cold' should be 'remarkable power of resisting cold'.

Why a partially blocked plague-infected flea is more dangerous than a completely blocked one should be more clearly stated.

Under cholera, the reference to Tomb and Maitra's work on cholera on page 495 might be made clearer, and the statement on page 494 that atmospheric moisture may convey the virus is rather vague. Is it meant that the vibrios can be carried over during the process of vaporization of water?

More could have been written on the epidemiology of cerebrospinal fever in view of the recurring epidemics in India, and finally epidemic dropsy and beri-beri should have been treated separately.

A. K. S.

LABORATORY MANUAL OF THE DEPARTMENT OF BACTERIOLOGY AND IMMUNOLOGY, PEIPING UNION MEDICAL COLLEGE. Prepared under the direction of C. E. Lim. Second Edition. 1935. Published by the Division of Bacteriology, Peiping Union Medical College, Peiping, China. (Printed at the Kwank Yuan Press.) Pp. 190. Price, \$1.50

As an outgrowth of the worksheets of a large teaching and research institution, this little manual will prove of great interest and value as a guide to all laboratory workers for whom it provides a useful compendium of laboratory methods that have been proved accurate and convenient.

The chapter on laboratory animals especially is excellent and contains much useful information. All details for breeding, handling, transportation, experimentation and disposing of animals are given in brief. These details together with the table giving the hematology of animals commonly employed in experimental bacteriology will be frequently referred to by many laboratory workers.

Another feature of the book is that, although references are given at the end of each chapter, a special chapter is devoted to providing an excellent selection of reading references. All the most recent and standard works are included in the list which should prove a valuable guide to students for whom it is primarily intended.

Sections on staining methods, and on pathogenic fungi together with the instructions for the autopsies of animals and the brief description of a few biochemical tests have added to the scope of the second edition.

The manual is small, compact and well printed and should find a place beside *Stitt's Manual of Bacteriology* in all clinical laboratories.

A J H DE M

RADIOLOGICAL ATLAS OF CHRONIC RHEUMATIC ARTHRITIS (THE HAND).—By S. Gilbert Scott, M.R.C.S., L.R.C.P., D.M.R. & E. (Camb.). 1935. Oxford University Press, London. (Humphroy Milford.) Pp. xiv plus 76, with 30 plates. Price, 25s.

The hand has been called 'the visiting card of the rheumatic patient'. In this excellent publication Dr. Scott has in his own inimitable manner set forth the mere important radiological features met with in arthritic conditions, showing the bony changes seen in the hand and very lucidly explaining the reasons therefor in the underlying pathology. This is certainly one of the clearest expositions we have seen of the distinctions between rheumatoid or atrophic arthritis, hypertrophic or osteo-arthritis, chronic infective arthritis, and gout. The book will be found invaluable by both clinicians and radiologists. The plates illustrating it are admirable.

G G

DISEASES OF THE THYROID GLAND.—By Arthur E. Hertzler, M.D. With a Chapter on Hospital Management of Goitre Patients. By V. E. Chesky, M.D. Third Edition, Entirely Rewritten. 1935. The C. V. Mosby Company, St. Louis. Pp. 348. Illustrated. Price, \$7.50

The part played by the endocrine glands is becoming more important every day as fresh problems arise, and the third edition of this present interesting volume will be welcomed by physiologists and clinicians alike. The vast experience on the subject of Professor Hertzler is embodied in the pages of this treatise, and his study has brought convincing evidence before the medical profession that the activity of the interstitial cells is associated with a definite clinical type of thyroid intoxication.

The book has been divided into a number of chapters dealing with the anatomy and physiology of the gland, effects of derangement of the function of the gland, the varieties of goitres developed both during childhood and adolescence with their recent nomenclature and

classification, malignant growths of the gland, and the morbid anatomy of such growths. The description of goitres in unusual places has considerably added to the importance of the book. The concluding chapters include the hospital management of goitrous patients, their treatment both medical and surgical and the various complications arising during such treatment, all discussed from a practical point of view.

Lastly the author has described operative technique relating to the gland, the choice of a suitable anæsthetic during such operations, the details of which are of particular value.

The book is beautifully printed and lavishly illustrated with excellent drawings; for the most part they are made up of clinical photographs which speak of the author's personal experience and impressions on the subject. The book though fairly compact contains a wealth of information and will be of equal interest both to the practising physician and the specialist.

MEDICINE FOR NURSES.—By W. Gordon Sears, M.D. (Lond.), M.R.C.P. (Lond.). 1935. Edward Arnold and Company, London. Pp. vii plus 412. Illustrated. Price, 8s. 6d.

This volume is a comprehensive book for nurses, based on a course of medical lectures given to those who are in training on the syllabus of the General Nursing Council for England and Wales; to such it will prove a most useful book.

However, it lacks sufficient information on tropical diseases to be of great use to nurses training in India, but in other respects it will be an interesting addition to the nurses' library. Useful illustrations appear and the book is nicely printed on good paper.

The chapter on infectious diseases is very comprehensive, and that on deficiency diseases equally so and will help the nurse to a clearer understanding of this subject.

M. E. A.

Abstracts from Reports

REPORT OF THE EUROPEAN MENTAL HOSPITAL AT RANCHI FOR THE YEAR 1931 BY MAJOR MOORE TAYLOR, M.D., D.P.H., I.M.S., MEDICAL SUPERINTENDENT

The number of patients resident in the hospital at the beginning of the year was 203 (101 males and 102 females) against 203 (99 males and 104 females) in the preceding year, while the maximum number resident on any one night was 215 (105 males and 110 females) against 212 (107 males and 105 females) in the previous year. The total admissions during the year under report was 72 (33 males and 39 females) against 54 (37 males and 17 females) in the previous year. Of these, 29 were re-admissions (15 males and 14 females) against 26 (15 males and 11 females) in the previous year.

The general bodily health of the patients has been good, and there was no epidemic of any kind throughout the year.

The daily average of sick treated in hospital during the year under report was 381 (150 males and 231 females) against 408 (164 males and 244 females) in the preceding year.

No form of seclusion or restraint has been adopted during the year under report, nor has it been necessary to withdraw parole from any patient.

To-day in the United Kingdom and in the United States of America, there are twice as many hospital cases of dementia præcox (schizophrenic reaction types) than tuberculosis, and, were statistics available, it would, I am confident, be proved that a similar state of affairs exists in India. In this hospital no less than sixty per cent of the patients are of this type. The

ætiology of this disease is still unsettled, its pathology is unknown, and its clinical limits are in dispute, yet it is a more serious problem than either tuberculosis or carcinoma.

During the last two decades we have seen enormous advances in every other branch of medicine, but the psychiatrist struggles with his most difficult burden of advance alone. The anatomist, the physiologist, the bacteriologist, the virus worker, and the biochemist have, so far, done nothing material to clear the path for his progress. Psycho-analysis has undoubtedly thrown light on some of the symptomatic mechanisms, but psycho-analysts themselves doubt its efficiency as a therapeutic procedure during the psychoses. Far be it from me to condemn psycho-analysis, but before it is undertaken it must be borne in mind that the prognosis will depend on (1) whether the difficulties can be brought into consciousness, and (2) whether they can be dealt with successfully by the patient, if they are so brought. It is difficult to believe that the mere bringing of them into consciousness is enough, and it not infrequently happens that, when an unconscious trouble is made conscious, it is found to be of a kind with which the patient cannot deal, and to which he cannot reconcile himself. The patient's condition may be made much worse, not only for the time being, but permanently. Much has been written concerning psycho-analysis but there have been comparatively few impartial surveys of the subject. The present consensus of opinion, however, would appear to be that in psycho-analysis there are many weaknesses. Analysis of the unconscious is, at any rate, an extremely difficult and delicate procedure, analogous to a major surgical operation, and should only be attempted with a sense of grave responsibility.

One might quote the sound advice of that very eminent psychiatrist, the late Sir Maurice Craig, C.B.E., M.D. (Cam.), F.R.C.P. (Lond.), for many years consulting physician in Psychological Medicine at Guy's Hospital, London, who said 'the physician whose attitude of mind leads him to prefer psychical to physical ætiology should beware of overlooking a collection of pus in his preoccupied concern with the patient's mental confusion and hallucinations. Delighted as he may legitimately be in tracing an anxiety neurosis to a forgotten incident of childhood, in replacing a maladaptation to the facts of life by a wiser and saner mental outlook, hours of misplaced psycho-analytic enthusiasm may be saved by a urinary test or a glance at the optic discs'.

One is confronted with many difficulties in mental diseases—the factors may be in consciousness although the patient has not correlated them with the fact that he is ill, while in others the difficulty may be one which is unconscious. For many patients there is an apparent advantage in illness, and the type of persons who take refuge in illness, every time that life becomes exceptionally troublesome, is even found in mental hospitals, and occasions do arise when patients have literally to be pushed out.

In the causation of mental disease, the old controversy on heredity versus environment continues. Both are in some measure factors, but in view of the modern connotation of the term mental disease and mental deficiency it is felt that environment plays a greater rôle than is generally realized in certified cases.

In discharges and re-admissions two problems are involved, the eugenic and economic.

Jenning's researches dispel the idea that mental defect can be eliminated by preventing the propagation of mental defectives. He claims that the great number of defective genes that give rise to abnormalities are present also in normal individuals. Other eminent investigators also express views which give no aid to the propaganda for bettering the human race by sterilizing our patient. At a time when American literature is so favourable to sterilization of selected types, it is a pleasant diversion to find some who sincerely see nothing to be gained by it. At the same time, however, the responsibility of sending a patient forward

to the committee of visitors with a recommendation for discharge is no light one. Experience proves that the discharged patient is frequently a burden and a nuisance to relatives and friends. To a once successful and prosperous individual, this, together with a lack of suitable employment, and the dreary round of job-hunting, is frequently the cause of re-admission. The patient, reduced to shabbiness and shaken in morale, quickly drifts into irritability, panics, depressed states and even delusions of persecution, and the psychiatrist has the discouraging experience of seeing his patient returning sometimes worse than ever. I am convinced that, in a large number of patients, the main underlying cause of their condition is a difficulty to find access to a regular job and economic independence, and the inability to hold any but the poorest jobs. Disturbed attitudes, loss of health and morale, due to the deprivations caused by unemployment, undoubtedly lead to psychological undermining. This has been vividly witnessed among those out of work for both a short and long period.

The economic factor is one which affects this hospital more than any other in India. Patients are brought from long distances, and it has frequently happened that the expenditure in sending them home and having them returned to hospital has been more than three or four times the amount which it would have cost to maintain them for the short periods they were able to remain out of hospital. This re-admission rate is an extremely important one, and in order to focus attention on the real state of psychological medicine, I am of the opinion that it would be better if psychiatrists were to be a little more conservative in the use of the word 'recovery'. Instead, one might suggest that the term 'good result' might be utilized for patients who remain out of hospital and require no treatment for over a year, 'very good result' for patients who remain out for over two years, an 'excellent result' for over three and under five years. The term 'recovery' might be reserved for those not requiring hospital treatment for over five years.

The reports of practically all mental hospitals reveal the fact that many patients have been sufferers from mental disease for many years before any appropriate or skilled treatment has been administered. Approximately eighty per cent of patients, when admitted to hospital, could be classified as 'chronic' and this state of affairs will continue, so long as our medical men receive inadequate instruction in psychiatry.

In the better medical schools, psychiatry is regarded seriously, though not so much time is given to teaching as some of us think necessary, but in some schools in India no instruction is given in psychiatry whatsoever. No individual should be granted a licence to practise medicine until he at least knows the rudiments of psychiatry and has gained a working knowledge of the more common forms of mental disorder, and it should be the concern of all teaching bodies that young practitioners should be taught to develop a sound understanding attitude towards the psychological, educational, and social aspects of medicine. The young doctors must, above all, be taught that the majority of cases of insanity which receive timely and appropriate treatment are curable, and to feel that they have failed in their duty when they merely call in the specialist when it is too late, and then, under his guidance, sign a certificate of insanity.

In the year under review no startling facts have been uncovered in the treatment of mental diseases. There are no tricks in psychiatry, and the casual observer visiting a mental hospital may, at first sight, jump to the erroneous conclusion that nothing is being done for the insane. Even medical practitioners will frequently ask what special form of treatment is given, and will be amazed to find that, with the exception of a few suitable patients who are undergoing treatment with special drugs, medicinal treatment is limited to the occasional use of sedatives, hypnotics and purgatives.

Physical ailments frequently accompany mental disease, and teeth, eyes and feet usually show lack of care, as well as minor digestive troubles. There is on the staff of this hospital a qualified visiting dentist who takes over the care of the teeth immediately the patient is admitted, and the minor physical ailments, which are sometimes cherished by the patient, are appropriately dealt with. It might be asked them 'what is done for the mental patient'?

The sheet anchors in treatment continue to be good nursing, dieting, the careful use of drugs, hydrotherapy, psychotherapy, and among these occupational and social therapy take the prominent place. The value in this line of treatment lies in the fact that the patient is made to realize that there are still some things which he can do successfully, and although he has failed outside, it is important for him to recognize that he can succeed under hospital conditions. An attempt is also made to restore the patient's self-respect, and efforts are made to abolish the imaginary stigma of a psychosis. The patient is approached upon his own intellectual perceptive, emotional and volitional level. This may appear to be a dogmatic formulation, but both the psychiatrist and the therapist will readily recall many cases of failure due to deficient, excessive, or distorted function of these elements of the personality. It is always necessary not only to explain the methods of the proposed therapeutic project but also the reason for it. Emphasis is laid on its social co-operative nature and significance in developing the patient's capacity. Provision is also made for progression and graduation, and formal recognition given to the patient who has advanced to a higher grade.

Only the infirm and physically unfit are excused attendance at the occupational department. Over 80 per cent of the patients in this hospital are employed in work which is interesting to them. The selection of work is carefully made by the Medical Superintendent in consultation with the occupational therapists, a prescription is made out and progress carefully recorded, and changes made where necessary, otherwise there is apt to be irritation, friction, disorder, boredom, and introspection.

The patient will, if capable to that extent, receive training in manual and industrial arts, the preparation and serving of foods, raffia work, cane-work, basket-making, chair-making, rug-weaving, carpentry, embroidery, the use of the fret-saw, weaving, sewing, crocheting, knitting, and even more intricate work, which may have little actual industrial value in later making him or her self-supporting in the community, but will at least provide satisfaction in terms of creative value, and fill the thoughts to the exclusion of anything less desirable.

The patient is quickly impressed by the attitude of tolerance and understanding in which he is approached by the medical and nursing staff of the hospital. He sees that an attempt is being made to create a closer relationship through genuine, personal, kindly and understanding interest. The successful psychiatrist and the mental nurse must first have learnt 'the art of being human', and to make the patient feel at ease and comfortable, and not to attempt to exact at first too much from the autistic personality of the patient. It is necessary to realize the essential slowness of the readjusting process. Intolerance and impatience must have no place in the treatment, and it has always to be remembered that the most precious and coveted possession of the patient is his individual personality, and he must be made to feel that his rights are guaranteed.

Let me here pay a tribute to the staff of this hospital. Their work is of a very high standard indeed. The deputy superintendent has been on the staff for over ten years, the senior house physician over eleven years, the junior house physician over five years while the matron has over sixteen years, and no nursing sister has less than three years' service, the periods varying from three to eleven years. The medical staff, the nursing staff, and the occupational therapists are

required to attend the clinical meetings, for it goes without saying that the nurse or the therapist, who does not know one disease entity from another, can be of little value, and probably do much harm.

There is a weekly dance at which the hospital band plays and, in addition, there is a cinema weekly and sometimes bi-weekly.

The Roman Catholic and the Church of England chaplains conduct services in the respective chapels every Sunday.

No hard and fast rules are laid down regarding the social therapy, because the particulars depend on the individuals themselves. The games, dancing, participating in sports, etc., are used as a means of socializing the patients, and widening interests in all possible directions.

It is recognized in all modern mental hospitals that occupational and social therapy are the most useful agents we possess in promoting improvement and recovery, and in this hospital this department is being further developed.

Selected patients are now permitted to arrange their own bridge-parties and, during Christmas of last year, a large number of patients organized and formed themselves into a carol singing party and made the round of the residences in the vicinity of the hospital. They collected a sum of Rs. 30 which they later expended on a picnic for themselves and some of their friends.

During the year the patients have also given many excellent concerts, which have been enjoyed by many members of the public. A special tribute is due to Sister Mason and Mr. Bose, the physical culturist, who organize these concerts. To Captain Mayes, the house steward, who continues to act voluntarily as bandmaster, I also extend grateful thanks.

During the year under review, 42 patients (24 males and 18 females) were discharged as recovered or improved. All underwent treatment in the occupational and social therapy department. The favourite occupations for the males appeared to be carpentry and weaving, while the female patients elected needle work, crochet and cookery. Knitting socks and stockings by machine, and Italian embroidery are new occupations which have been introduced in the female section during the year.

The hospital has now a first class gymnasium which has been fitted up with parallel bars, bridge ladders, Roman rings, rowing apparatus, etc., and physical culture has proved very popular with a large number of the patients. On Founder's Day an acrobatic display and a torch-light tattoo were held on the sports ground, and many of the patients exhibited great skill.

During the summer months, batches of patients were taken to the lake for swimming and rowing, and in seasonable weather the usual weekly picnic parties were organized, and despatched to the various beauty spots within a twelve-mile radius of the hospital.

Two fancy dress dances were organized for the patients, one during the Puja holidays and one during the Christmas vacation. These were thoroughly enjoyed and over 100 patients appeared in really excellent costumes, all of which were made in the occupational department. A combined concert by the staff and patients was given at Ranchi and the proceeds of over Rs. 200 were donated to the Viceroy's Earthquake Relief Fund.

One patient, who showed no response to any treatment, is now being given lessons on the pianoforte, in which she is taking a very keen interest.

On the whole, the co-operation of the patients has been excellent, but in order to stimulate interest in work, and to check indolence and truancy it was necessary in 27 cases to introduce a system of food tickets. Lunch was only served to those of the 27 who had earned a ticket. The main rationale of this procedure was, of course, neither punitive nor coercive, but essentially co-operative. In 26 cases, rapid improvement occurred and there have been no relapses to

indolence. In only one female patient there was no improvement. No patient is on this system at present.

Every day about 60 per cent of the patients participate in outdoor games. Seven cricket matches were played with outside teams, and of the total the hospital won five. Inter-section football and hockey matches were frequently played. The hockey shield this year was won by the South Section and the football shield by the North Section. Cycling is still very popular and there are at present 15 cycles and one tricycle in the hospital, reserved solely for the use of the patients, but this number is inadequate to meet all demands, and they are given out in rotation. Tennis, badminton, croquet, and basket-ball are indulged in every day.

Special treatment.—In seven cases of maniacal excitement treatment by hydrotherapy was used with success. In three cases prolonged narcosis by somnifen injection was tried, but all three patients failed to respond to this treatment. In eight cases where somnifen was used orally slight improvement occurred.

Sulfosin alone, and also combined with solganol, has been tried in many cases of schizophrenia and manic-depressive reaction types, but without success. One case of manic-depressive insanity was discharged recovered, but it is doubtful whether any claim can be put forward for this special form of treatment. It may have been a natural remission. Success has been claimed for this method of treatment in some institutions, but in view of the negative results achieved in this hospital, and the extremely painful nature of the treatment, we feel compelled to abandon its further use.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1933. VOLUME II ON THE HEALTH OF THE ARMY IN INDIA

Cerebro-spinal meningitis.—Hitherto only sporadic cases have occurred among British troops at rare and irregular intervals. Among Indian troops cases have been more common, particularly in certain recruiting battalions. The disease as it occurs in India is of a severe and fulminating type, and death frequently ensues within 48 hours of the onset of symptoms. The mortality rate is extremely high, averaging 70 per cent over five years. As serum is administered (intrathecally and if necessary intravenously and intramuscularly) in all cases there is little evidence that this form of treatment has any effect on the course of the disease.

The disease has of recent months shown a marked increase among the civil population and the situation presents several disquieting features.

Cysticercosis.—Interest in this condition, as it affects India, has been revived in consequence of recent and important work on the subject.

Prophylactic measures advised were of a general nature, because the exact mode of infection is not yet known—although carrier infection is suspected. At present there is no evidence to show that human cysticercosis is the result of auto-infection.

Dengue.—As heretofore, the majority of the cases of dengue have occurred in the personnel of garrisons in seaport towns. Owing to the proximity of the barracks to areas occupied by the civil population, the problem of eliminating the vector of the disease is a very difficult one.

Sandfly fever.—The figures for sandfly fever have remained at a very constant level for the last three years. The majority of cases continue to occur in Northern India, and particularly in certain stations on the North-West Frontier.

Sandfly fever has been the subject of special investigation during the year.

The entomological aspect of the problem has been studied in Landikotal, where the investigations were directed by a specially trained worker detailed by the Indian Research Fund Association.

As far as they went, the results obtained were satisfactory. The exact local conditions required for sandfly breeding were defined, and once this had been

done no difficulty was experienced in locating innumerable breeding places. So widespread are these conditions that the problem of control appears, under Indian conditions, to be practically insoluble. In compact and well administered areas such as Landikotal itself, something might be accomplished: in straggling cantonments such as Peshawar the problem is a hopeless one. Work is nevertheless being carried out to determine the best method of treating breeding areas so that this knowledge may be available should special circumstances arise calling for its application.

It was mentioned in last year's report that it seemed possible that infection was being acquired (as far as Landikotal is concerned) through men being bitten while on duty at night in the perimeter defences. Control observations were made during 1933 on a group of men who at no time were on night duty on the perimeter. The incidence in these men showed no appreciable difference from that in the remainder of the garrison, from which it would appear that infection is being acquired in the barrack rooms as well as elsewhere. The complaint made by the men that they are bitten more severely while on the perimeter is probably due to the fact that, being awake, they notice the bites to a greater extent.

The investigation of the aetiology of the disease, which has been going on at Peshawar, has produced interesting results. In 1932 certain observations were made which suggested that the causal organism in at least a proportion of cases (for it was thought that clinical variations in type could be detected) was a leptospira.

By carrying out a large series of blood cultures (some 500) under ideal and carefully controlled conditions, this theory has been definitely disproved, and it can confidently be stated that sandfly fever of the Indian Frontier is not leptospiral in origin.

On the other hand, experiments which are not yet in a final state leave little doubt that a filter-passing virus is responsible, and attempts are being made to obtain this virus in a fixed form, in the hope that this may prove a stepping-stone to the production of some form of immunizing agent.

Fever of the typhus group.—An increase in the number of cases of this condition which have been diagnosed is probably to be attributed to a more widespread knowledge of the subject.

While the disease is more common in certain localities than in others it is nevertheless widespread throughout the country.

No definite progress has been made as regards the detection of the vector of this disease in India, but opinion is gaining weight that the tick is by no means the only arthropod involved.

Diphtheria.—Diphtheria is a disease in which the information given by the laboratory can on occasion be very confusing. In the straightforward case with clinical signs no difficulty exists. Treatment is inaugurated at once on the strength of the clinical data and the laboratory affords confirmation of the correctness of the procedure. In cases which clinically are suggestive, but doubtful, the result of the examination of a swab is invaluable. But in those cases of sore throat where no suggestion of diphtheria exists, but where a precautionary swab is taken, the outcome is often dire confusion. Experience has shown that innocuous diphtheroids which are morphologically indistinguishable from *Corynebacterium diphtheriae* are of relatively common occurrence. Where such are found present in the swab, few clinicians will accept the responsibility of treating the case other than as one of diphtheria until negative information is afforded by biochemical or biological tests. This involves swabbing and segregation of contacts, and frequently leads to numbers of men being unnecessarily off duty.

To minimize this as much as possible, special investigations have been made into the technique of isolating and testing the virulence of the organism, and a method has been devised which reduces considerably the interval of time necessary to give a definite result.

Dysentery, diarrhoea, colitis and amebic hepatitis.—In the last ten years there has been an upward trend in the admission ratio for these diseases. This has been attributed to the greater interest taken in the subject and to the fact that the necessity for reporting sick in all cases of the kind is constantly being impressed on all ranks.

A study of the different types of infection in bacillary dysentery throws an interesting light on the epidemiology of the disease. Some fifteen to twenty types of dysentery bacilli, of which ten are of comparatively common occurrence, can now be differentiated. Occasionally there may be a group or series of cases which is caused by the same type of organism, and is therefore referable to a common source. More frequently, however, this is not the case, and if an analysis be made of the types of bacilli in all cases occurring in a regiment in one season, it will be found that great diversity exists, and that few if any of the cases are aetiologicaly related to each other. In other words, infection is not due to case to case spread within the unit, so much as to a constant bombardment from the massive and varied reservoir which exists among the civil population.

Within the confines of his own lines the soldier can be, and in most instances and to a large measure is, protected against infection. But it is neither practicable nor desirable that he should be constantly confined to barracks, and as soon as he moves afield the chance of safeguarding him from infection becomes remote, despite such measures as are taken regarding restaurants and other similar establishments. The diversity of organisms which are isolated is clear evidence of the fact that he derives his infection from such widespread sources.

In the absence of protective inoculation, it would seem that the reduction of diseases of this group can only be affected by raising the standard of sanitation among the civil population. In the cantonments much can be, and is being, done; but where there exist adjoining municipalities, or worse still villages in which sanitary control is practically non-existent, the problem is one which bristles with difficulties. Any improvement which may ensue will be of very slow development.

Tropical abscess of liver and hepatitis.—In all, 59 cases of liver abscess and hepatitis were admitted of which 36 were considered to be amebic in origin. This is a considerable drop from previous years. Five of the 36 cases were diagnosed as amebic abscess, but only 2 were treated surgically. There were no deaths nor invalids. One case relapsed twice.

Enteric fevers.—The variation in the number of cases occurring amongst British troops in three years is trifling.

The cases were sporadic in origin with the exception of an outbreak of 16 cases of typhoid fever in a detached company of infantry at Muzafferpur and an outbreak of 9 cases of paratyphoid A in Allahabad. The outbreak of typhoid fever was one of great severity, there being four deaths (*i.e.*, a case mortality of 25 per cent) and seven other cases whose condition gave rise to grave anxiety. The type of cases was in fact, in no way different in severity from that described in preinoculation days; and it is significant to note that all these men were 'protected', *i.e.*, inoculated with two doses of T. A. B. vaccine within a period of 18 months. This gives further support to the observation made in a previous report, that inoculation, although it definitely appears to lower susceptibility to infection, has little if any action in mitigating the severity of an attack when this is established. The source of infection was not traced, but there is reason to believe that milk which found its way into the lines from an unauthorized source was responsible. All the patients were in the habit of drinking milk as a beverage.

The outbreak of paratyphoid A was mild. It was traced to a carrier—a coffee-shop employee—who had been working in the same establishment for three years,

and who therefore had presumably acquired his infection recently.

The position as regards diagnosis remains unchanged. Early blood culture is without question the most satisfactory method. Faeces and urine culture lend little assistance, and the agglutination test, while on occasion it may be of positive value, is of no negative significance. For use in this test concentrated suspensions of organisms are being issued with satisfactory results. Owing to the certainty with which batches of suspension can be prepared of a uniform standard, the 'standard agglutinin unit' is being abandoned, and results will be expressed in terms of the denominator of the dilution in which standard agglutination occurs, an interpolation table being used where necessary.

T. O. suspensions continue to be used as a routine in these tests, and certain laboratories have experimented with A. O. and B. O. No striking results have been obtained, and the opinion is gaining weight that this test adds little to the results obtained by the older methods of diagnosis.

In view of the conclusions reached at the R. A. M. College regarding the Rawlings strain of *Bact. typhosum* which is used in the manufacture of T. A. B. vaccine, this question as far as it concerns India has been given close attention. T. A. B. vaccine for use in India is manufactured by the Central Research Institute, Kasauli. Here, as elsewhere, the Rawlings strain has been used, but from time to time this strain has been subjected to animal passage and as a result has maintained a 'smooth' character. In addition to strain Rawlings, however, it has for some years been the practice to incorporate equal parts of a recently isolated and definitely smooth strain of *Bact. typhosum* in the vaccine. It would therefore appear that the Central Research Institute vaccine has been manufactured throughout from 'smooth' strains of *Bact. typhosum*.

While this subject was under review, some very striking figures were compiled in regard to the incidence of 'proved' typhoid fever in the first and in subsequent years of service in India. The proportionate admission ratio, case mortality and death ratio among men of over 1 year's service and under 1 year's service are as follows:—

	Over 1 year	Under 1 year
Admission ratio ..	1	4
Case mortality ..	1	2.1
Death ratio ..	1	8.6

There are various causes which may contribute to this state of affairs. Assuming exposure to infection to be more or less universal and inevitable, susceptible individuals who have little or no resistance even after inoculation are likely to be picked out early in their Indian service. Naturally-developed immunity will be higher the longer the man serves in the country, and in the same way repeated inoculation may have a cumulative action. Also the old soldier becomes more experienced in looking after himself. It will be of great interest to observe the effect which the use of the R. A. M. College vaccine has on the incidence of typhoid fever during the first year of service.

The policy of examining menials for the carrier condition has been maintained. In all 11,560 menials were examined, a total of 39,657 stools being plated. This resulted in the detection of 3 carriers of *Bact. typhosum*, 2 of *Bact. paratyphosum A*, and 1 of *Bact. paratyphosum B*. At first sight this seems a poor return for the labour and time expended. On the other hand, the work has fulfilled its purpose as there have been no outbreaks traceable to the enlistment of a carrier.

Malaria.—[Under this heading there is a full and interesting discussion on the reasons for the differences in the years 1933, 1932 and 1924. These years have

been chosen for comparison because 1932 was the best and 1924 the worst malaria years for the British Army in India. This discussion does not lend itself to abstraction and we are unable to give it in full for want of space, but it is a valuable contribution to the epidemiology of malaria in India and should be read in the original. We give, however, the concluding remarks on this section which gives a summary of the position in 1933.]

In Northern Command the relapse rate has fallen from 50 to 40 admissions per 1,000 of strength. This fall would have been more marked if the command had enjoyed peace conditions. Field service operations at the worst part of the year entail heavy and repeated infections and, in some cases, inadequate treatment.

Approximately a quarter of a million mosquitoes were trapped in the Peshawar barracks. Trapping was also tried out with success at Bannu. The value of this measure is enhanced when it is employed in barracks adjacent to breeding grounds which cannot be effectively controlled.

At Kohat the incidence of the disease shows a distinct tendency to diminish and the mosquito-proofing of the McQueen lines has probably played an important part in this most desirable result.

A comparatively large number of fresh infections were reported from the hill station of Razmak. No doubt the bulk of these represent infections of troops on detached duty at Bannu and Dera Ismail Khan.

At Lahore senior Boy Scouts were trained in anti-malaria measures, and did good work in the sadar bazar area.

In Eastern Command the improvement in the malaria statistics would have been remarkable had it not been for adverse conditions in Delhi. The ratios per 1,000 for this station are disturbing; they show a deterioration of the situation thus—

1929	..	..	..	..	114.3
1930	..	..	..	..	191.4
1931	..	..	..	..	200.4
1932	..	..	..	..	198.3
1933	..	..	..	..	309.4

The situation in Western Command also gives rise to anxiety. Here the per mille figures were:—

1929	..	..	..	..	130.9
1930	..	..	..	..	92.8
1931	..	..	..	..	140.8
1932	..	..	..	..	131.1
1933	..	..	..	..	204.0

Temporarily, at least, this command has lost the reputation for salubrity which it formerly enjoyed.

In Southern Command, Jubbulpore and Mhow—formerly the two worst stations in the command—were placed 7th and 3rd respectively in the incidence table. Trained antimalaria officers have been in charge of these two stations for some years, and it would seem that their labours are at last bearing fruit.

The problem of malaria in India, in all its many facets, is of never-failing interest. This interest, to sanitarians and clinicians alike, was fully maintained during the year under review. However, in this field of medical activity caution is a desirable quality; and it may be well to allow Mr. Jorrocks to write the epitaph of 1933, thus:—'Far be it from me to say that you will be much wiser from anything you have heard, for the old stager will find nothing but what he knew before, while all that can be taught the beginner is not to be too sanguinary in his expectations'.

Plague.—This tropical scourge, like cholera, makes its appearance in the pages of Indian sanitary reports with a fair degree of regularity; but nowadays, in British health reports, it is an uncommon subject.

A severe epidemic of the disease occurred in the Bombay Presidency, and notably in the civil-municipal areas, Poona. These areas surround, are contiguous to, and are even thrust well within, the cantonment area.

Early in August a very virulent and severe outbreak occurred in the village of Ghorpuri. This village was

not under military control, and its position as regards the troops' quarters was most dangerous. The villagers refused to co-operate in the anti-plague measures advised. On the 24th of August dead plague-infected rats were found inside the cantonment boundary. By the middle of September all troops had been inoculated against infection. Regimental and cantonment rat extermination squads were trained and set to work on an intensive anti-rodent campaign. Trapping was not found to be nearly as successful as baiting: 'Common sense' rat bait and barium carbonate were used.

Kirkee cantonment, near Poona, also became infected, but less severely. Gradually, rodent infection spread: dead infected rats and squirrels were found all over Poona cantonment. The epidemic began in the city of Poona in January 1933. It smouldered on through the hot weather, and flared to its height in August, September and October. Before the plague exodus took place, the population numbered 160,000. A conservative estimate, up to the end of November, puts the number of attacks at 1,400, with 984 deaths.

In the cantonment, between 30th September and 28th November, 1933, only 14 cases occurred, and no British personnel contracted the infection.

There is no doubt that, but for the energy and enthusiasm displayed by the medical and executive officers in charge of this alarming epidemic, the results would have been very different, and probably very disastrous.

Rabies and prophylactic anti-rabic inoculation.—No comments on this subject have been made for some years.

Prophylactic anti-rabic inoculation has now been almost completely decentralized from Pasteur institutes. Military anti-rabic centres exist in all the larger stations, except a few in which convenient civil centres are established.

Carbolized vaccine is obtained by military centres from the nearest Pasteur institutes. The system of dosage has not been finally standardized, and military centres conform to the practice of the institutes from which their vaccine is obtained. For statistical purposes comprehensive details are obtained in every case and supplied to the parent institute.

This system has proved very satisfactory, and in every way preferable to the old system of despatching individuals, often under the most trying weather conditions, to distant Pasteur institutes. Command and District Laboratories now undertake the examination of the brains of suspected rabid dogs.

THIRTY-SECOND ANNUAL REPORT OF THE BUREAU OF SCIENCE, PHILIPPINE ISLANDS, FOR THE YEAR ENDING 31ST DECEMBER, 1933. BY ARTHUR F. FISCHER, ACTING DIRECTOR

THE work of the Bureau of Science for the public covers a wide field and directly or indirectly touches almost every phase of human activity in the Philippines.

The health of the public is protected against epidemic diseases by vaccines manufactured by the Bureau of Science. The most outstanding accomplishment along this line was the manufacture of cholera-dysentery vaccine, of which a total of 6,310,600 doses was distributed, mostly to the Bureau of Health. In addition, large quantities of other vaccines were manufactured and disposed of. In all, the Bureau of Science disposed of 15,109,290 doses of vaccines. Among the most important of these were vaccines against smallpox, cholera, typhoid, and dysentery.

Smallpox, which used to be a tremendous scourge and caused terrible epidemics, is now little feared owing to the use of vaccine. The efficiency of this vaccine is due to a considerable extent to improvements introduced in its manufacture by the Bureau of Science. The last cholera epidemic was ended with the use of Bureau of Science vaccine against cholera. So long as vaccination is continued there should be no

further epidemics. Vaccine has also been a great agency in the control of typhoid. More recently the Bureau of Science perfected an antidysenteric vaccine suitable for local conditions and causing no painful reaction.

The Bureau of Science promotes the health conditions in the Islands in many other ways. Important among these is the examination of foods submitted by various agencies, including the Bureau of Health and the Customs. Such substances are examined to see that they meet the requirements of the Pure Food and Drug Act. Particularly important is the examination of imported canned goods, such as salmon and sardines. Some of the local products examined include ice-cream, coco-nut and other vegetable oils, meats, lard, milk, soft drinks, alcoholic beverages, bread, confectionery, fruit, vegetables, fish, sugar, molasses, soaps, cheese, dyes, flour, and cereals. Bacteriologic examinations are also made on the food handlers in Manila. Waters all over the Philippines are examined, both bacteriologically and chemically, and no waterworks project is started until the Bureau of Science certifies that the water is suitable for human consumption.

The Bureau of Science also assists the Quarantine Service in keeping out epidemic diseases. In 1933, 65,154 rats were examined for plague as a protection against the introduction of this disease in the Islands.

Better known is the anti-rabic treatment. Each treatment consists of twenty-five injections, which are furnished free. A total of 2,676 treatments were given during the year. The anti-rabic treatment is also used by city veterinarians in Manila to vaccinate dogs.

The Bureau of Science assists the Bureau of Health, the Quarantine Service, and other Government entities as well as private doctors in making diagnoses by examining specimens, such as faeces, blood, sputum, and urine. In 1933, 21,959 examinations were made. For the protection of the public the Pure Food and Drug Act of the Islands requires that the containers of drugs and biologic products be properly labelled and that the labels state accurately the constituents of the drug. Under this law drugs are collected by the board of medical and pharmaceutical examiners and inspectors and analysed by the Bureau of Science; if found to be mislabelled, they cannot be sold.

The strength of cement and other structural materials that go into the construction of buildings and the strength of the resulting concrete are very important from the standpoint of public safety. The Bureau of Science is required to test all cement used in Government structures, in buildings in the City of Manila, and the resulting concrete in these structures.

The Bureau of Internal Revenue is in charge of the supervision of weights and measures used to weigh and measure articles sold in the Philippine Islands, but the Bureau of Science carries on the examination and certification of standard weights and measures.

The Bureau works for the farmers by examining soils and fertilizers. All fertilizers sold are required to be registered in the Bureau of Science, and the Bureau of Commerce inspects fertilizers to see that the farmer gets the composition guaranteed by the manufacturer.

The Bureau also aids the farmer by investigating the cause, prevention, and remedies of plant diseases and by giving information and advice on these subjects.

The Bureau of Science is open to the public for consultation on all matters pertaining to science, and it makes examinations for the public of almost all conceivable kinds of articles. These examinations include medical specimens, cotton goods, paper, leather goods, galvanized iron, mineral oils, food products, paints, and practically anything that requires testing.

Consultations and advice are given free to manufacturers of and merchants dealing in soaps, oils, paints, dairy products, soft drinks, ice, artesian water, etc.

The researches conducted by the Bureau of Science have aided the development of industries in the Philippines, the promotion of sanitation, and the development of medicine.

Researches conducted by the Bureau of Science have resulted in the establishment of numerous industries and the improvement of a great many more, while the possibilities of still other industries have been pointed out. These include glass, paper, vitrified brick, ceramics, medicinal remedies, paint oils including lumbang, and numerous others.

Original work done by the Bureau of Science along medicinal lines has been very important. An enumeration of all of it would require much space, but one example may be mentioned here. For many years beri-beri was a cause of much infant mortality, until scientists working in the Bureau brought forward tiki-tiki extract as a remedy. Tiki-tiki extract is now made by a number of firms and also by the Bureau of Science. The Bureau's product is distributed free by the Office of Public Welfare Commissioner through its puericulture centres.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL R. N. CHOPRA, C.I.E., Professor of Pharmacology and Officiating Director, School of Tropical Medicine, Calcutta, is appointed to officiate as Surgeon-General with the Government of Bengal, with effect from the 9th September, 1935, *vice* Major-General D. P. Goil, granted leave.

Lieutenant-Colonel R. Knowles, Professor of Protozoology, School of Tropical Medicine, Calcutta, is appointed, in addition to his own duties, to act as Director of the School, *vice* Lieutenant-Colonel R. N. Chopra, appointed to act as Surgeon-General with this Government.

Lieutenant-Colonel F. A. Barker, O.M.E., Officiating Deputy Director-General, Indian Medical Service, is appointed as Officer on Special Duty in the Home Department, with effect from the 24th August, 1935.

Lieutenant-Colonel M. G. Bhandari, on return from leave, is appointed to be Superintendent and Medical Officer, Yeravda Central Prison, *vice* Lieutenant-Colonel R. V. Martin, proceeding on leave.

Lieutenant-Colonel E. C. A. Smith, Superintendent, Central Mental Hospital, Yeravda, is appointed to be a Justice of the Peace within and for the territories subject to the administration of the Government of Bombay other than the Presidency of Bombay.

Lieutenant-Colonel N. J. Holgate, O.M.E., to be Civil Surgeon, Karachi, on the expiry of his leave, *vice* Major J. E. Gray.

Major J. E. Gray to officiate as Civil Surgeon, Nasik, *vice* Mr. V. L. Sathe.

LEAVE

Major-General D. P. Goil, K.H.P., Surgeon-General with the Government of Bengal, is granted leave for 22 days, with effect from the 9th September, 1935, with permission to prefix Sunday, the 8th September and to affix the Pujah Holidays and the following Sunday to the leave.

Lieutenant-Colonel A. D. Stewart, C.I.E., Director, All-India Institute of Hygiene and Public Health, Calcutta, is granted combined leave for 28 months, with effect from the 13th September, 1935, or any subsequent date on which he may avail himself of it, preparatory to retirement.

Lieutenant-Colonel S. A. McSwiny, Officiating Professor of Obstetrics, Medical College, Calcutta, is granted combined leave for two years, with effect from the 13th October, 1935, or any subsequent date of availing.

PROMOTIONS

Brevet-Colonel to be Colonel

W. H. Hamilton, C.I.E., C.B.E., D.S.O. Dated 6th August, 1935, with seniority from 1st January, 1922.

Majors to be Lieutenant-Colonels

H. C. Tait, M.B.E. Dated 2nd August, 1935.
 W. J. Webster, M.C. Dated 16th August, 1935.
 J. C. Chukerbuti. Dated 17th August, 1935.
 A. M. Ghosh. Dated 19th August, 1935.

Captains to be Majors (provisional)

R. L. Frost. Dated 15th August, 1935.
 J. C. Drummond. Dated 22nd August, 1935.
 D. M. Fraser. Dated 25th August, 1935.
 J. F. Shepherd. Dated 28th August, 1935.

RETIREMENTS

Lieutenant-Colonel V. B. Green-Armytage, 28th July, 1935.
 Lieutenant-Colonel H. Hingston, 31st July, 1935.
 Lieutenant-Colonel A. N. Thomas, D.S.O., 7th August, 1935.
 Lieutenant-Colonel A. P. G. Lorimer, on account of ill health, 8th August, 1935.

Notes

BRITISH MEDICAL ASSOCIATION MEETING
MELBOURNE

9TH TO 14TH SEPTEMBER, 1935

*Exhibit of Burroughs Wellcome and Company
(Australia), Limited*

THE constancy with which Burroughs Wellcome and Company remain in the forefront in the application of original research and of the latest scientific discoveries to medicine was well illustrated by the exhibits of this firm. The following products are selected for special comment:—

'Wellcome' insulin is now made from crystalline insulin of 100 per cent purity and is the first commercial product thus prepared.

The recent announcement of the isolation of the new ergot alkaloid—ergometrine—by Dudley and Moir was followed, within the remarkably short space of three weeks, by the first commercial issue of several preparations of ergometrine for administration by mouth or by injection. These products had a prominent place on the exhibit, together with ergotoxine ethanesulphonate, originated and introduced by Burroughs Wellcome and Company. The use of ergometrine followed by ergotoxine ethanesulphonate would appear to be ideal for use during the puerperium.

Digoxin, a pure, stable, crystallized glucoside, isolated from the leaves of *Digitalis lanata*, was also exhibited. This glucoside discovered at the Wellcome Chemical Works, Dartford, England, is of known and definite chemical composition so that the results obtained by its use are uniformly reliable. Digoxin may be used whenever drugs of the digitalis group are indicated.

'Tannafax', a preparation for the modern treatment of burns and scalds, consists of tannic acid in a water-soluble base. It is always ready for application and is specially valuable for first-aid work.

Several preparations for use in leprosy and which were introduced as the result of work conducted in the Wellcome Chemical Research Laboratories were also to be seen, while organic arsenic and bismuth preparations were shown as examples of spirillicides. Numerous 'Tabloid' brand products were exhibited. These are characterized by exceptional purity, accuracy of dosage and reliability.

'Kepler' cod-liver oil with malt extract is a valuable dietary adjunct and contains vitamins A, B and D in their natural association. It is extremely palatable and easily digested.

A HÆMOGLOBIN SCALE

THE method of estimating hæmoglobin by means of a piece of blotting paper and a printed colour scale, against which the blood-soaked paper is matched, is admitted by most medical men to be a *very rough* method, but still it is claimed that it is better than guessing the degree of anæmia by looking at the patient's tongue, especially in India when this is often stained with *pan*. Further, it is the only method that can be completed as rapidly as timing the pulse, and it requires the minimum of apparatus; for these reasons it is probably the method that is used nine hundred and ninety-nine in every thousand times that the hæmoglobin is estimated in this country.

If this method has to be used, then the essential is to obtain a well-printed scale. The manufacturers of Idozan, a colloidal preparation with high iron content that is used largely in anæmias of the iron-deficiency type, have put up a useful hæmoglobin scale that appears to fulfil the necessary requirements; it is in the form of a neat little booklet that will easily go into the pocket, not being as bulky as the usual form of hæmoglobin scale.

The agents, Messrs. Coates and Cooper, 94, Clerkenwell Road, London, E.C. 1, say that they are prepared to send this scale to any physician who cares to apply for it.

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Original Articles

SOME OF THE MAJOR COMPLICATIONS IN THE TREATMENT OF SYPHILIS

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ON the subject of the complications and untoward reactions which arise in the course of treatment for syphilis, we have a considerable volume of literature, including the reports of the German and British Commissions set up to investigate them. A multiplicity of predisposing factors, dependent on the patient, on the disease, on the drug, and on the technique of its administration, have been investigated and described. These investigations have helped to some extent towards the prevention of some of these reactions, but, in spite of all this work, the inevitability of the occurrence of these reactions in a certain percentage of cases is realized by all clinicians who have any considerable experience in treating syphilis.

This paper sets forth our experience in the study and treatment of some of the major complications in the treatment of syphilis in the venereal clinic of the General Hospital, Madras, during the three years 1932, 1933 and 1934. During this period 7,160 cases of syphilis were examined and treated of which 5,575 were males and 1,585 were females including children. The treatment was outpatient and ambulatory in more than 95 per cent of the cases. The routine method of treatment adopted in the clinic is the combined or concurrent method whereby both the organic arsenicals and the heavy metals are administered simultaneously. The injections are given once a week. The route of administration of the arsenicals is intravenous in adults and intramuscular in children. The heavy metal is given by the intramuscular route. The arsenical preparation used as a routine during the greater part of the period was neo-salvarsan (Bayer) except for six months in 1933 when novarsenobillon (May and Baker) was used. The bismuth preparation was 'Hypoloid Bismuth Metal' (Burroughs Wellcome). In children one of the sulfarsenobenzene preparations was used. The dosage of the arsenicals for an adult varied from 0.3 gramme to 0.45 gramme and rarely exceeded the latter. It is not sufficiently realized by doctors in this country, and especially in South India, that the dosage scales advocated by European and American clinicians are unsuitable for the average Indian. So far as South India is concerned the average weight of the adult patient of the hospital class varies from 80 to 100 lbs. and we feel convinced the European dosage is much too heroic.

The three major complications which form the subject of the present study are:—

- I. Cutaneous reactions,
- II. Jaundice, and
- III. Haemorrhagic encephalitis.

I. Cutaneous reactions

The cutaneous reactions were the most frequently observed complication and were caused in almost all the cases by the trivalent arsenical preparations. The occurrence of heavy-metal skin reactions, though described, is so rare that it can be ruled out from the present discussion. Sixty-two cases of cutaneous reactions were seen and treated in the department. Of these five cases had developed skin trouble as the result of injections received outside from private practitioners. Table I gives the clinical classification.

TABLE I

Clinical variety of cutaneous reaction	Males	Females, including children	Total
Erythema ..	14	6	20
Severe exfoliative dermatitis	15	5	20
Mild exfoliative dermatitis	7	5	12
Lichenoid dermatitis ..	..	1	1
Fixed exanthem ..	..	1	1
Arsenical pigmentation ..	2	1	3
Arsenical hyperkeratosis ..	2	..	2
Herpes zoster ..	3	..	3

All the five outside cases were males and included two cases of exfoliative dermatitis, two of erythema and one of hyperkeratosis of the palms and soles.

Table II gives the incidence of the reactions in relation to the total number of cases and to the number of injections given.

TABLE II

	Males	Females, including children	Total
Total number of syphilis cases.	5,575	1,585	7,160
Total number of injections of the arsenicals.	19,529	5,021	24,550
Number of cases with cutaneous reactions.	38	19	57
Incidence in relation to cases.	1 in 147	1 in 83	1 in 126
Incidence in relation to the number of injections.	1 in 514	1 in 264	1 in 431

Predisposing factors

The ages of the adult patients varied from 20 to 58, the average being 35 years. There

were two children aged 5 months and 11 months in the series.

Sex.—There was a distinct relative preponderance of females showing cutaneous intolerance to treatment, but the severity of reactions were milder than in the males. This relative increase in skin reactions in the female was in marked contrast to the decreased incidence of the other major complications.

Religion.—The Hindus formed the majority of the cutaneous reactors, but they constitute 70 to 80 per cent of the patients attending the clinic. Hence, no special significance could be attached to the increased incidence among them.

Social status, diet, alcohol, etc.—It is our impression, though exact figures are not available, that 95 per cent of the syphilitic cases that attended the clinic belonged to the poorer classes who live on a bare subsistence. It is a well-known fact that the diet of the poorer class in South India consists mostly of carbohydrates with little protein and less fat. The predisposition to arsenical intoxication may be greater in these persons if one is to take into consideration the analogy of animal experiments conducted by Craven in America, who showed that dogs fed principally on carbohydrate were more susceptible to the toxic action of arsenic. He also showed that a diet rich in protein and fat afforded increased protection to the animal. In the majority of the male patients who suffered from severe arsenical dermatitis, a history of ingestion of alcohol was obtainable, and it is quite conceivable that alcohol with its injurious action on the liver may be a contributory factor in the increased severity of the cutaneous reactions, if not in their incidence.

Influence of the stage of syphilis on cutaneous reaction.—Table III gives the incidence of the cutaneous reactions in relation to the stage of syphilis for which treatment was given. In the table are included four non-syphilitic cases, all males, who had received injections outside.

TABLE III

Stage of syphilis	Males	Females	Total
Primary ..	3	1	4
Secondary ..	10	1	11
Tertiary ..	18	8	26
Latent ..	5	6	11
Congenital ..	..	2*	2
Neuro-syphilis ..	3	1	4
Non-syphilitic ..	4	0	4
TOTAL ..	43	19	62

* Children.

This table shows that among syphilitics the incidence of cutaneous reactions is greatest amongst those with late entrenched infection,

nearly 73 per cent being in this class. Apart from the increased incidence the most severe forms of exfoliative dermatitis occurred only in tertiary syphilitics. Three factors may possibly account for this:

(i) An allergic cutaneous instability induced by chronic long-standing syphilitic infection.

(ii) Injuries to the endothelium of the capillaries caused by *Spirochaeta pallida*, and intensified by the vasculo-toxic action of arsenic.

(iii) Injuries to the liver and kidneys caused by chronic late syphilis may interfere with the oxidation and elimination of the drug.

As Kolmer has rightly pointed out, the syphilitic factor should not be over-emphasized, as we had four cases of arsenical dermatoses in non-syphilitics. Another peculiarity in our series was the occurrence of moderately severe dermatitis in two children under one year of age suffering from congenital syphilis. We are not aware of any report of dermatitis occurring in such young infants mentioned in the literature on the subject. The ages of the children were five and eleven months, respectively, and both completely recovered from the attack. The father of one of these children who was receiving anti-syphilitic treatment for asymptomatic late syphilis also developed a very severe form of exfoliative dermatitis and narrowly escaped with his life. The simultaneous susceptibility of both father and child to arsenical intoxication in this instance may either be a coincidence or point to some common undetermined factor.

Relation of the number of injections to the dermatoses.—Table IV gives the number of cases which occurred after the number of injections.

TABLE IV

Number of injections	Number of cases	Number of cases in group and per cent of total	
1	1	16	26
2	2		
3	7		
4	6		
5	10		
6	5	41	66
7	8		
8	6		
9	7		
10	5		
11 to 13	4	5	8
19	1		

The largest number of reactions occurred between the 5th and 10th injections. The majority of the cases of exfoliative dermatitis developed the complication between the 5th and 7th injections. The milder cutaneous erythemas mostly occurred between the 1st and 4th injections.

TABLE V
Seasonal incidence of the reactions

January	0	9 cases
February	2	
March	2	
April	1	
May	3	
June	1	53 cases
July	8	
August	6	
September	9	
October	15	
November	8	
December	7	

This table shows the striking preponderance in the incidence of the cutaneous reactions in the second half of the year. Such a striking disparity cannot be a coincidence, but may have a definite ætiological significance. During the second half of the year it is our impression that the general health of the population is at a lower level of efficiency than during the first half. The fevers, coughs, colds and gastro-intestinal upsets seem to be more prevalent in the latter half. The rains of the north-east monsoon, the humidity of the atmosphere and the severe fluctuations of meteorological conditions are more prevalent during the second half of the year and may have some as-yet-undetermined influence on the general health of the population and indirectly on the incidence of the cutaneous reactions.

The relation of cutaneous reaction to the brand of drug used.—It is a well-known fact that the 'neo' preparations of trivalent arsenicals vary widely in their toxicity, oxidizability and therapeutic action. This variation is found not only between different brands of the drug but also in different lots of the same brand. During 1933, the largest number of cutaneous reactions, with two deaths, occurred when two different brands of the drug were used. It is possible that the varying toxicity of different preparations may have a contributory influence on the cutaneous reaction.

The factor of induced allergy.—The cutaneous sensitizing effect of technically incorrect intravenous injection, which permits a little of the drug to infiltrate the skin, may render the patient intolerant to subsequent injections of the same drug. The chances of perivenous cutaneous infiltration are more likely to occur in women in whom the veins are small and the induced sensitization may account for the greater incidence of cutaneous reactions in them. We had only one definite case in the female in whom this factor of induced sensitization due to the faulty skin infiltration precipitated a dermatitis after the subsequent injection of the same drug. The greater incidence of toxic effects arising from the administration of the sulfarsenobenzene preparations, which are usually given subcutaneously or intramuscularly, is attributed by many clinicians to this factor of induced allergy, but we have not had sufficiently large an experience

of these preparations to warrant an expression of opinion on the point, as the vast majority of the injections were given intravenously in the clinic. The occurrence of cutaneous complications after a fewer number of injections that are not in themselves sufficient to produce a cumulative action on the system may also be considered as a point in favour of induced allergy. The factor of natural hyper-susceptibility to arsenic is not proved and seems to be so rare that it is not an important ætiological factor in cutaneous reactions.

The influence of focal infections.—According to Stokes and Cathcart,¹ an allergic instability of the skin is induced by circulating bacterial proteins which are liberated from a focus or foci of infection by the administration of trivalent arsenicals and the cutaneous reaction is of the nature of an anaphylactic phenomenon. The injury to the liver and suprarenals might be contributory factors. Moore and Keidel explain the cutaneous dermatoses in a different way. They believe that bacterial anaphylaxis may be the fundamental change, that the organic arsenicals favour the production of bacterial anaphylaxis, and that these in turn by producing vaso-dilatation of the skin favour the deposit of arsenic which acts as an irritant.

The hepato-toxic hypothesis.—Hoffman propounded the theory that the liver is injured by the arsenic and loses its power of detoxicating the drug when subsequently administered, with the result that it tends to accumulate in the skin and cause dermatitis. In support of this theory a number of cases of coexisting jaundice and dermatitis have been reported in the literature. In our series there was only one case of dermatitis followed by jaundice and none of the cases of jaundice developed any cutaneous reaction.

Summary.—From the foregoing discussion of the ætiological factors, it appears that a multiplicity of causes, rather than a single one, is responsible for the cutaneous reactions of arsenical therapy. Osborne's recent investigations have shown that the trivalent arsenicals are vasculo-toxic. They injure the endothelium of the capillaries favouring the perivascular deposition of arsenic. Induced allergic cutaneous instability, brought on either by the drug itself or by bacterial proteins or by chronic syphilitic infection, may be a contributory or concomitant factor. Injury to the liver or suprarenals, the former by interfering with the elimination of arsenic, the latter by producing a deficiency of circulating adrenalin, may favour the accumulation of arsenicals around the blood vessels of the skin. The depressing effect of arsenic on the bone marrow may account for the severer reaction of the skin and very often for the fatal results.

Description of the different cutaneous eruptions.—The erythemas constitute nearly a third of the total number of reactions. They

developed usually after the second or third injection. They start with chills, malaise and pains all over, followed by an erythematous eruption which may be macular, papular, morbilliform or scarlatiniform in type. There is no lividity nor infiltrative exudation of the skin. In about three or four days the condition subsides with fine furfuraceous desquamation. Sometimes the desquamation is large and flaky



Fig. 1.—A case of severe exfoliative dermatitis.

especially on the palms and soles. Stoppage of arsenic and a few injections of sodium thio-sulphate will suffice to cure this condition. Many authorities, including Milian and Stokes, recommend the continuance of the treatment with arsenicals after the subsidence of the erythema. In our series the patients exhibited so much fear of any further injections that they defaulted from our observation. Hence we had

no opportunity of testing the possibility of continuance of the treatment.

Acute exfoliative dermatitis constituted nearly 52 per cent of the cutaneous reactions. Twenty cases were severe and twelve were mild. The incidence in relation to the number of injections and number of cases is shown in table VI, in which the two cases of dermatitis admitted from outside are not included.

TABLE VI

	Males	Females	Total
Number of cases	5,575	1,585	7,160
Number of injections.	19,529	5,021	24,550
Number of cases of exfoliative dermatitis.	20	10	30
Proportion to cases.	1 in 279	1 in 158	1 in 239
Proportion to injections	1 in 976	1 in 502	1 in 818

Though the incidence of exfoliative dermatitis was twice as frequent in women as in men, the severity of the reaction was very much less in the former than in the latter. Eighty-one per



Fig. 2.—Exfoliative dermatitis in an infant five months old.

cent of the cases of exfoliative dermatitis occurred between the 5th and 10th injections, 2 to 14 days after the last injection. In a typical case the condition starts with a severe

chill and intense itching all over the body. A diffuse livid infiltrative erythema appears on the skin and rapidly becomes vesicular or bullous in places, especially at the joint flexures, behind the ears and round the neck. There is considerable swelling of the face, particularly the eyelids and lips. The weeping eczematous condition with fissuring and crust formation makes the patient an object of misery. The patient is restless and may be so irritable that it may be difficult to obtain his co-operation in treatment. In spite of the severe shivering from which these patients suffer, fever was absent in a majority of the cases and in the early stages. Temperature of a hectic type was observed in those who developed secondary pyogenic infections. In a few of the severe and fatal cases, the patient rapidly went into a low typhoid state with a low muttering delirium. The weeping eczematous condition of the skin subsides after a variable time giving place to a dry dark-brown leathery scaly condition. The exfoliation goes on continuously and may be so abundant that the patient will be literally lying on a bed of scales. At this stage the patient rapidly loses weight. The hair and nails may be shed. The skin of the palms and the soles are the last to peel off. The mucous membranes of the mouth, pharynx, trachea, conjunctiva, vagina and intestines may share in the exudative exfoliative process. In a favourable case the patient enters on the convalescent stage, the irritability of the skin disappears, his appetite improves, and there is less and less scaling. The skin assumes a glazed, bronzed, atrophic condition. In some of our very dark-complexioned patients the skin became of a lighter tint. One patient developed a permanent vitiligo of the skin of the neck and shoulder. In some of the cases of exfoliative dermatitis who have recovered, the combined effect of emaciation, change in the colour and texture of the skin, and a certain indefinable change in the contour of the face, makes them unrecognizable by their own relatives.

Complications.—The following are the complications observed in our cases of exfoliative dermatitis :—

	Cases
Persistent diarrhoea	15
Melæna	2
Pyogenic abscesses and suppurating lymphadenitis.	6
Cellulitis and gangrene of the foot ..	1
Bed sore	1
Broncho-pneumonia	1
Jaundice	1
Albuminuria	6

Blood examination.—It is being increasingly recognized that acute exfoliative dermatitis is but a manifestation of a gross injury to the vascular system and the bone marrow. As such, a regular and complete examination of the blood for signs of bone marrow injury should form a part of the routine in the investigation and

treatment of this condition. In 23 of the cases of dermatitis a leucocyte count of the blood was performed and the following were the results :—

	Cases
Moderate leucocytosis, the increase mainly of the lymphocytes and eosinophiles.	7
Moderate leucopenia at the expense of the polymorphs.	4
Eosinophilia	15
Lymphocytosis including mononuclears	9
Transitional myelocytes	3

Duration of the complication.—The mild cases cleared up in three weeks. The severer ones lasted from 8 to 10 weeks.

Prognosis and mortality.—The prognosis of exfoliative dermatitis is always uncertain and grave. Unfavourable points in prognosis are :

1. Evidence of bone marrow injury. A drop in granular leucocytes, a rise in eosinophiles and lymphocytes, a drop in red blood cells and platelets.
2. Persistent diarrhoea.
3. Bleeding from mucous membranes.
4. Respiratory distress and cyanosis.
5. Gross and severe secondary septic infections.

The mortality statistics of different observers show a 25 to 30 per cent toll of death rate. The deaths in our cases were three, all in males one of which was an outside case.

Incidence of deaths from exfoliative dermatitis in relation to the number of cases treated. 1 in 3,550

Incidence of deaths from exfoliative dermatitis in relation to the number of injections. 1 in 12,275

Percentage of deaths in relation to the cutaneous reactions. 5 per cent

Percentage of deaths in relation to exfoliative dermatitis alone. 9.4 „

Causes of death in our series

Bleeding from the bowels and mucous membrane of the mouth ..	1 case
Intractable diarrhoea and septic parotitis ..	1 case
Gangrenous cellulitis foot ..	1 case

Lichenoid eruptions.—This is a rare and interesting form of arsenical cutaneous intolerance. There was only one case in our series. A Hindu married woman, aged 37, attended the department for pigmentation of the palms and soles. Her blood Wassermann reaction was strongly positive and she was receiving injections of neosalvarsan and bismuth. After the fifth injection she complained of itching and a dusky erythema of the limbs and face. The treatment was stopped and sodium thiosulphate injections were given. The itching and erythema disappeared after four injections of sodium thiosulphate. Three weeks after the subsidence of the skin trouble a patch cutaneous test with neosalvarsan was performed on the patient and

found negative. The treatment with neosalvarsan was restarted. Three days after the first injection of neosalvarsan she broke out with itchy, purplish, papular eruptions on the limbs, chest, back and neck. No more arsenic was given but in spite of a number of injections of sodium and calcium thiosulphate the lesions continued to progress and finally assumed a dark bluish pigmentation with lichenification. In the chest and neck the eruptions coalesced to form large irregular patches. There was no disturbance of general health and no involvement of the mucous membranes. The patient is still under observation and treatment. Auto-hæmotherapy and exposure to ultra-violet rays are being tried.



Fig. 3.—Lichenoid eruptions, post-arsenical.

The fixed arsenical exanthem.—This is another rare but interesting type of cutaneous reaction, and was observed in a female patient. A circumscribed solitary, itchy, urticarial patch developed on the inner aspect of the left thigh after each injection of neosalvarsan. The patch disappeared after a few days only to reappear after the next injection. After the fourth injection the patch did not disappear but became thickened and slightly eczematous. The weekly injections were continued till the patient finished a full course. The patch remained stationary. The patient was lost sight of after the first course of treatment.

Arsenical pigmentation, 3 cases, 2 males and 1 female.

In all the cases the pigmentation appeared after 10 to 15 injections of neosalvarsan. The

pigmentation was patchy, non-itchy and found principally on the face and neck near the hair margin. There was no increase in the melanosis when the treatment was continued. During the rest interval they tended to disappear.

Arsenical hyperkeratosis, 2 cases, males.

One was an outside case. In both the cases the condition started after three injections of sulfarsenobenzene. There was hyperkeratosis of the palms and soles with fissuring and scaling. The fissures were very painful and tender and disabled the patients from using their hands and feet. The lesions were not associated with any other cutaneous trouble.

Herpes zoster, 3 cases, males.

Two cases developed herpes zoster after the third injection and the third after the tenth injection. The herpetic vesicles developed along the course of the 8th and 9th dorsal nerves, and on the anterior and upper part of the chest wall in each of the three cases respectively. The condition was associated with a certain amount of burning pain, and disappeared in a fortnight. The treatment was continued in all the three cases without any mishap. It is doubtful whether the lesion was arsenical in origin or merely a coincidence during the treatment.

Prophylaxis of the cutaneous reactions.—It may be remembered that a certain percentage of the cutaneous accidents in the arsenical treatment of syphilis seem inevitable and do occur even in the best conducted clinics and practices. This does not mean that the clinician should spare any pains in the careful investigation of a case before treatment. In the first place, a thorough examination of the syphilitic patient regarding the condition of the skin, liver and kidneys is a desideratum in any well-conducted syphilo-therapeutic practice. Gross pathological conditions of the organs of the body are of course contra-indications to the treatment with the arsenicals, or an indication that great care should be exercised. The history of any allergic sensitivity in the patient should be elicited and noted down. The existence of any focal infection in the teeth, tonsils, prostate, etc., should be investigated and may require appropriate treatment. The vagotonic highly nervous type of patient is supposed to be a bad reactor and hence great care is required in the treatment of such a person. Smaller doses of the drug at shorter intervals rather than massive doses at long intervals should be the method of choice. After every injection and before the next injection is given the patient should be questioned as to how he fared after the last injection. Repeated chills, fevers, gastrointestinal disturbances after every injection signify intolerance and the treatment should not be blindly pushed. Itching of the palms and soles, a state of increased excitability, a feeling of apprehension and the absence of a sense of well-being, these are forewarnings

of impending cutaneous trouble. The preventive value of the patch test to determine whether the patient is likely to be sensitive to arsenic or not has not been fully investigated. In our own experience in the only case in which the test was performed a negative result did not prevent the onset of cutaneous trouble later, when the treatment was restarted. But the test is of great help in those cases of cured exfoliative dermatitis in whom the question of resuming the treatment with the arsenicals may arise. The test is performed as follows :—

0.3 gramme of the arsenical preparation which is to be used in treatment is dissolved in 1 c.cm. of water. A small square bit of lint is soaked in this solution, applied to the forearm of the patient and kept in place with adhesive plaster. After 24 hours the lint is removed and the area of the forearm examined. A positive reaction is indicated by a patch of dermatitis with vesiculation and means that the patient is sensitive to the drug.

The protective value of the simultaneous administration of sodium thiosulphate along with the arsenical drug has been disappointing in our experience. One of our fatal cases of exfoliative dermatitis was receiving injections of sodium thiosulphate along with the arsenical preparation from the very commencement of treatment. In spite of this precaution, he developed a very severe dermatitis after the 8th injection and died of excessive bleeding from the bowels. It is our opinion that sodium thiosulphate neither prevented the onset of dermatitis nor alleviated the severity of the attack.

Treatment of cutaneous reactions.—The milder cutaneous reactions respond quickly to the stoppage of arsenic and the administration of three or four injections of sodium thiosulphate. The treatment of exfoliative dermatitis, the most serious and dangerous type of cutaneous intolerance, will tax alike the resources of the doctor and nurse as well as the patience and co-operation of the patient. The patient should be hospitalized and skilled nursing instituted. As these patients with severe dermatitis suffer from chills in the earlier stage of the condition due to the effect of cutaneous vaso-dilatation, every precaution should be taken to ensure warmth. This was secured in our cases by the application of continuous radiant heat by means of electric bulbs. Scrupulous cleanliness and changing of the bed linen will prevent the grosser forms of secondary septic infection. It is a great advantage to keep the patient in an air or water bed. In the light of Craven's conclusions on the influence of diet on dermatitis, it seems advisable to put the patient on a diet rich in proteins and fats. Plenty of milk, cream and eggs constitute the chief diet. The patient should be encouraged to drink large quantities of water to aid elimination of toxic products. In view of the great frequency of diarrhoea as a complication, purgatives should be avoided.

In constipated cases a soap-and-water enema may be given on alternate days. In persistent diarrhoea we have found daily enemata of saline or potassium permanganate solution one in ten thousand more efficacious than any medication by mouth. Periodic differential blood counts during the course of the disease form an essential routine in the treatment, to gauge the severity of the affection and as an aid in prognosis.

Special therapeutic measures.—The following are the measures recommended and used :

1. The administration of sulphur-containing compounds.
2. Glucose and insulin therapy.
3. Calcium compounds.
4. Preparations of liver.

1. The compounds in use are sodium thiosulphate, intramine, contramine, thiosinamine, selvadine, and calcium thiosulphate. We have used sodium thiosulphate as an intravenous injection very extensively in our cases. Five to ten c.cm. of a ten per cent solution is given intravenously on alternate days for four to six injections. Our experience with this drug was rather disappointing. The preventive value of this drug when simultaneously administered with the arsenicals was nil in some of the cases in which we tried it, but it had very beneficial effects on the milder erythemas. In the typical exfoliative dermatitis we did not observe any good from its administration either as regards the severity of the attack or the duration. When the drug was administered continuously, milder cases of dermatitis turned into fulminating types after the fifth or sixth injection. The rationale of administering sulphur compounds in exfoliative dermatitis in which there is considerable perivascular accumulation of arsenic in the deeper layers of the skin seems questionable. In an acute explosive accident like dermatitis, sudden and rapid liberation of arsenic as insoluble sulphides may throw considerable strain on the excretory organs of the body, and this fact may account for the exacerbation of the dermatitis which we have time and again observed in the continued administration of sodium thiosulphate. On the other hand we tried calcium compounds either with or without sulphur and were satisfied with their beneficial effects. Calcium gluconate or calcium thiosulphate in 10 per cent strengths were employed in a number of cases in which the previous injection of sodium thiosulphate resulted in an aggravation of the dermatitis. The effect on the exudative and eozematous processes was striking. The skin became drier and less irritable and cutaneous infiltration and thickening lessened. A maximum of six injections (5 to 10 c.cm.) daily or on alternate days by the intravenous route is good practice. The action of calcium on various exudative and inflammatory conditions is well known. In

exfoliative dermatitis it probably acts by restoring vasomotor instability of the cutaneous vascular sympathetic system, by checking the increased permeability of the capillary walls and the inflammatory serous exudation in the deeper layer of the skin, and by indirectly decreasing the cutaneous irritability. When calcium compounds with a sulphur radicle are administered the action of calcium, combined with the detoxifying effect of the sulphur moiety is obtained, though we would consider calcium as the more important constituent.

We have had very gratifying results from the administration of liver extracts either by mouth or by injection. Continued experience convinces us that it should be placed first and foremost among the therapeutic measures in the treatment of dermatitis and other intoxications of organic arsenicals. In three of our hyper-acute rapidly-progressive cases the patients turned the corner only after the injections of liver extracts. 'Campolon', a Bayer preparation, was used in these cases. It has now become a routine in our clinic to administer liver to patients suffering from dermatitis. In those patients with gastro-intestinal irritability, the liver is given as an intramuscular injection. In the last 11 cases of dermatitis in our series where this routine was followed, there was not a single death. The action of liver on dermatitis is not well understood. It might be a form of substitution therapy but it is very likely that its beneficial effect is on the blood-forming organs, the function of which is often depressed by arsenic.

Dreyfus, Harrison and others recommend the intravenous injection of 50 per cent glucose solution with injections of insulin to fix the former in the liver in arsenical dermatitis. Our experience with this method is limited to only one recent case not included in this article and is very encouraging.

A Hindu male, aged 54 years, with tertiary syphilis, developed exfoliative dermatitis after the fifth injection of neosalvarsan. In addition to the other general measures he was given 20 c.cm. of a 50 per cent glucose solution daily for three days and 15 units of insulin was also given subcutaneously. The action on the cutaneous condition was dramatic. The exudation disappeared, the oozing dried up and the patient sat up in a week and asked for more food. No other drug was administered.

The ordinary solution of glucose is slightly acid in reaction and is likely to produce a severe rigor after intravenous injection. Harrison recommends alkalization of the solution. In view of its marked beneficial effects in our case, it deserves a more extended trial.

Local treatment.—In the acute exudative eczematous stage, the frequent application of calamine lotion was the only measure adopted in our series. The action of calamine on drying up the exudation and diminishing the intense itching is remarkable. In the later stages of

dry, leathery exfoliation daily hot baths combined with the local application of a bland oil should be the routine.

Treatment of individual symptoms.—Stomatitis requires alkaline mouth washes. Cracked painful lips should be smeared with borated glycerine. For the conjunctivitis, we recommended washing with boric lotion and instillation of a few drops of ZB lotion. For the exfoliative ileo-colitis with diarrhoea, daily bowel washes with saline or potassium permanganate lotion should be given. For tracheo-bronchitis with dry troublesome cough, a sedative expectorant is indicated. If there is any sign of aplastic anaemia, bleeding from the gums, nose or bowel, transfusion of a matched blood should be immediately given. During the convalescent stage the food intake should be increased and vitamin B in the form of brewer's yeast was found very effective in our cases in toning up the skin and in alleviating the purplish oedema of the feet and legs from which these patients frequently suffer.

Effect of dermatitis on the Wassermann reaction.—We have not been able to follow up the majority of patients after they were discharged. In a few cases under observation there was a temporary reversal of the Wassermann reaction, but in four to six months the reaction became positive. The question whether the treatment with organic arsenicals may be resumed in a patient who suffered from exfoliative dermatitis should be answered in the negative though some recommend the use of a different arsenical preparation to the one which caused dermatitis. In this connection the value of the patch test with the particular preparation proposed to be used is very great. Figure 4 is a photograph of a positive patch test in a patient who suffered from a severe attack of exfoliative dermatitis six months before. Though he had no clinical evidence of syphilis his blood Wassermann was positive at the time of the patch test. It is safer to treat such patients with either mercury or bismuth.

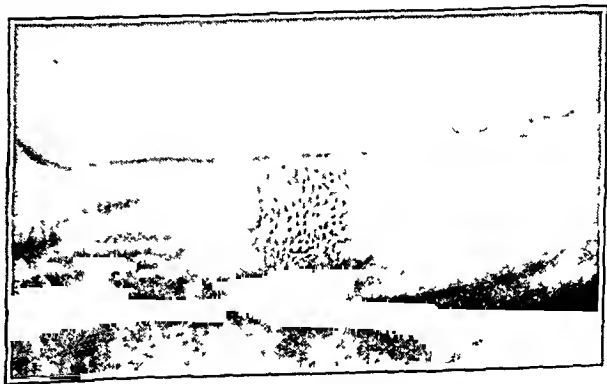


Fig. 4.—Positive patch test in the forearm in a patient who suffered from exfoliative dermatitis six months before.

Medico-legal considerations.—The possibilities of medico-legal trouble in these cases should

be borne in mind. A patient who was a victim of dermatitis as the result of treatment may haul up his doctor before a Court of Law for heavy damages. The doctor should satisfy the court that he took all reasonable precautions and exercised skill and care in the treatment of the patient. Unfortunately in our country the unrestricted sale of these arsenical preparations, the indiscriminate use of these powerful drugs, both by the qualified practitioner and by an army of unqualified quacks, compounders, and ward-boys, present a serious menace not only to the suffering public but also to the good name of the most outstanding therapeutic discovery of the twentieth century.

II. Jaundice

Jaundice takes the second place in the incidence of major complications in the treatment of syphilis.

Incidence.—There were 21 cases of jaundice in the three years' record of treatment. All the cases were benign and treated as outpatients. The incidence is given in table VII.

TABLE VII

	Males	Females	Total
Total number of cases treated.	5,575	1,585	7,160
Total number of injections.	19,529	5,021	24,550
Total number of cases of jaundice.	18	3	21
Proportion to cases.	1 in 310	1 in 528	1 in 341
Proportion to injections.	1 in 1,085	1 in 1,674	1 in 1,169

Age and sex.—The ages varied between 20 and 40, the average being 30. Unlike dermatitis there was a preponderance of males over females.

Jaundice in relation to the stage of syphilis

	Cases
Secondary syphilis ..	13
Tertiary syphilis ..	3
Latent syphilis ..	2
Early neuro-syphilis ..	2
Non-syphilitic ..	1
TOTAL ..	21

The striking preponderance of jaundice in secondary syphilitics under treatment is significant—a finding that may be a factor in the aetiology of the condition.

Jaundice in relation to the number of injections of neosalvarsan.—Nine cases developed jaundice after less than four injections, nine developed it between the 7th and 10th injections, three between the 10th and 20th injections.

Interval between the last injection and the appearance of jaundice.—The shortest interval was two days and the longest was 2½ months.

Five cases developed jaundice within a week, 6 cases from 1 to 3 weeks, and 10 cases from 4 to 10 weeks after the last injection.

Yearly and seasonal incidence.—Nearly 57 per cent of the cases of jaundice occurred during 1934. Neither the number of cases of syphilis nor the number of injections given during 1934 could account for the increase. The complication was more frequently observed during the humid and rainy months of the year, though this seasonal distribution was not so striking as in the case of dermatitis.

Aetiology.—The aetiology of jaundice in relation to syphilis under treatment is a most obscure problem. Various conflicting and divergent views are advanced:

I. The jaundice may be caused by syphilis alone. We have not come across even a single case of jaundice in an untreated syphilitic patient, though 7,160 syphilitic patients have passed through the clinic. In any case the purely syphilitic aetiology of the condition is outside the present discussion as all the cases of jaundice in our series developed the complication after treatment with the arsenicals.

II. Jaundice may be due to the combined action of the syphilitic infection and the arsenical remedy. Such a combination may act in several ways:

(a) A focal Herxheimer reaction may be set up in a case of asymptomatic syphilitic hepatitis after the injection of one or more doses of the organic arsenical with resulting congestion and jaundice.

(b) Milian of Paris is the staunch exponent of the view that jaundice is of a nature of a hepato-recurrence, analogous to the neuro-recurrence, and is caused by inadequate treatment with the arsenicals. The surviving spirochaetes are awakened into activity after the cessation of treatment and cause hepatitis and jaundice. His arguments in favour of this view are: (i) that jaundice occurs commonly at the end of six to eight weeks after the cessation of treatment which is the favourite period likewise for neuro-recurrence, (ii) that it is often associated with cutaneous or mucosal relapse, and (iii) that the jaundice disappears under further arsenical therapy. Milian has cited 30 cases of jaundice in inadequately treated syphilitics, where vigorous continuation of the treatment with the arsenicals has resulted in rapid and complete cure of the complication.

(c) The liver cells may be slightly damaged by the spirochatal toxins and may become more predisposed to the toxic action of the arsenicals.

III. The purely arsenical causation of jaundice has its own advocates. It is contended that the incidence of jaundice has greatly increased after the introduction of arsenicals in the treatment of syphilis, that jaundice has been known to occur in non-syphilitic patients as the result of the injection of the arsenical and that certain lots of the drug are more likely

to produce jaundice than others. The 'neo' preparations are alleged to be more 'icterogenic' than the salvarsan preparations. In support of the arsenical theory may be cited the report of the British Medical Research Council (no. 55, 1920) on eight fatal cases following the use of '606'. Pathological examination of the liver in these fatal cases revealed gross degenerations and necrosis, lesions resembling those caused by another hepato-toxic drug tri-nitro-toluene.

IV. The view advocated by Stokes and Ruedemann and supported by certain British observers is that jaundice in treated syphilitic subjects may be neither due to syphilis nor to the medicament but may be caused by incidental intercurrent infection of an undetermined nature. The occurrence of jaundice in a syphilis clinic may be part of an epidemic prevalence of the condition in the general population. Further, jaundice may be more prevalent during certain months of the year when there may be a general increase in the respiratory, gastro-intestinal and other forms of infection. The experience of the Mayo clinic is cited as a point in favour of this theory. Stokes and Ruedemann state that jaundice was a rare complication in the treatment of syphilis in the Mayo clinic from August 1916 to August 1918; from August 1918 to July 1920 there was a tremendous increase in the incidence of jaundice though the brand of the drug and the technique of administration remained the same throughout the four years. The increased incidence could not be accounted for by any Herxheimer reaction or hepato-recurrence as all the patients received thorough treatment. It is stated that the arsenic may be a predisposing factor by inducing a mild hepatitis but the exciting cause is an organismal infection of unknown aetiology.

Summary of aetiological considerations.—As in the case of arsenical dermatitis a multiplicity of causes seems to be at work. From our series of cases, certain inferences may be drawn:

1. All the cases of jaundice in our series were mild, lasted from one to four weeks and completely recovered from the attack. A few of them returned to the clinic after the rest interval and continued treatment without any relapse of jaundice.

2. Nearly 62 per cent of the cases who developed jaundice were suffering from early secondary syphilis at the time of the commencement of the treatment. It is possible that a proportion of these cases might be due to hepatic Herxheimer reaction.

3. There was no constant relationship between the total dosage of the drug and the incidence or severity of jaundice. Jaundice was equally common after four injections as after seven to ten injections. There were only three cases of jaundice between ten and twenty injections. These facts seem to be against a purely arsenical aetiology.

4. Only 24 per cent of the cases were cases of early jaundice developing within a week after the last injection. The rest were cases of late jaundice. Judged from the interval of time, a large percentage of the cases seems to be due to hepato-recurrence, the result of inadequate treatment. In this connection it may be stated that the majority of syphilitic patients in the clinic default after a few injections when the active manifestations of the disease disappear. Amongst the few patients who underwent thorough treatment lasting from 18 months to 2 years, no jaundice was observed.

5. The increased incidence of jaundice during the rainy months of the year and the marked preponderance of this complication in 1934, as compared to the preceding two years, may point to an extraneous factor probably infective or epidemic in the causation of the complication.

Clinical manifestations.—The majority of patients with jaundice presented the following symptoms and signs: malaise, anorexia, nausea and itching of the skin. A few patients complained of slight chill and fever. The urine contained bile in all the cases. The stools were not examined. There was discomfort in the upper abdomen and slight enlargement of the liver in 10 per cent of the cases. All the cases were ambulatory.

Van den Bergh reaction.—This was carried out in 15 of the cases and the following are the results. In every case the indirect reaction was positive; in 9 cases there was a positive direct, in one case a direct biphasic, and in 5 cases a negative direct reaction.

The quantitative estimation varied from 3.2 units to 17.2 units.

Treatment.—Injections of the arsenicals were stopped. Four to six injections of sodium thio-sulphate, five to ten c.cm. of a ten per cent solution, were given on alternate days. The patients were given glucose by mouth and saline purgatives once in 2 or 3 days. In two cases of deep jaundice, injections of cytotropin were tried with satisfactory results. Under treatment, the jaundice cleared in from two to four weeks in all the cases.

III. *Hæmorrhagic encephalitis*

Hæmorrhagic encephalitis is easily the most formidable, fatal, and least unpredictable of all the major catastrophies in the treatment of syphilis. In the great majority of cases, this complication arises from the administration of the organic trivalent arsenical compounds and very rarely from heavy-metal therapy.

Incidence and predisposing factors.—The incidence varies widely in the experience of different clinicians, but fortunately it is the rarest of all the more serious complications of arsenical therapy. During the three years from 1932 to 1934, ten patients were treated in the clinic for this complication. Of these, four patients had received injections outside from

practitioners, and were brought to the hospital with fully-developed encephalitis, so that only six cases were really hospital cases. Among the ten, nine were due to arsenic and one to bismuth, the latter being one of the outside cases. The incidence of this complication in relation to the patients and to the total number of injections was as follows:—

Number of patients treated in the department.	7,160
Total number of arsenical injections given.	24,550
Number of cases of encephalitis ..	6
Proportion in relation to cases ..	1 in 1,193
Proportion in relation to injections ..	1 in 4,091

Age.—Young robust adults are more frequently affected. The youngest in our series was 17 years, the oldest 32 years, the majority under 30.

Sex.—There was a preponderance of males over females. Among the ten cases, nine were males and one female.

Analysis of the cases

	Number of cases
Sero-positive primary syphilis ..	2
Secondary syphilis ..	1
Latent syphilis with gonorrhoea ..	1
Tertiary syphilis with skeletal manifestation.	1
Latent syphilis with warts ..	1

The four outside cases were all non-syphilitic with a negative Wassermann. The first case had received sulfarsenol injections for chaneroid and bubo. The second patient was given solusalsvarsan and the condition for which the patient was given this injection could neither be discovered nor could be elicited from the relatives. The third patient had received an injection of novarsenobillon for chronic gonorrhoea. This patient had come to our clinic three weeks before his death. On examination it was discovered he had a chronic posterior urethritis, but no evidence of syphilis, clinical or serological. He was advised to undergo treatment for gonorrhoea, but he wanted salvarsan injections and persisted in spite of the negative Wassermann and absence of any evidence of syphilis; the injection was refused. He went to a gullible practitioner and had an injection of '914'; he was brought to the hospital with acute fulminating encephalitis and died within six hours of admission. It seems as if the patient went deliberately in search of death. A fourth case had received bismuth salicylate injections for chaneroid. His Wassermann was negative. He developed typical encephalitis ten days after the second intramuscular injection of bismuth salicylate. From this analysis it is obvious that this complication may supervene in syphilitic and non-syphilitic alike and that a heavy metal like

bismuth may occasionally be a factor in the production of this complication.

Influence of dosage and number of injections on the complication.—In the clinic cases the dosages of the arsenical preparations never exceeded 0.3 gramme. The dosages of the outside cases could not be definitely ascertained.

Three patients developed the complication after the first injection, four after the second, and three after the third.

Regarding the particular brand of drug used, four patients had injections of neosalvarsan and three had injections of novarsenobillon, intravenously, and one patient each had sulfarsenol, solusalsvarsan, and bismuth salicylate intramuscularly.

The conclusions from these findings are:

(a) The dosage of the drug employed has not affected the production of this complication.

(b) The complication sets in after a few injections or within the first three injections.

(c) Our figures may appear that it is more frequent after the intravenous injection of neosalvarsan or novarsenobillon than after the intramuscular injection of sulfarsenol or solusalsvarsan, but it should be remembered, so far as the clinic cases are concerned, that both neosalvarsan and novarsenobillon were used in the clinic to the almost complete exclusion of the other preparations, and that the patients who received sulfarsenol or solusalsvarsan were outside cases. Hence, a comparison to the detriment of the former drug is not justifiable.

Interval between the injection and the development of the complication

Days after last injection	Number of cases
4	3
5	3
7	2
8	1
10	1

The average interval works out as six days after the last injection.

Clinical picture.—The modes of onset vary. In three of the patients the onset was with severe headache, mental confusion, and inarticulateness. In two cases pyrexia of 104° and 105°F., with a noisy delirium, and disorientation was the first symptom. In five cases the onset was with epileptiform convulsions. In one of the pyrexial cases the patient had a diffuse scarletiform erythema of the face and chest. Whatever the mode of onset, the patient becomes rapidly comatose, and convulsions, clonic or tonic in type, recur at varying intervals.

Examination of the fully-developed case.—The patient lies comatose. There is generalized

THE TREATMENT OF LOBAR PNEUMONIA WITH INTRAVENOUS INJECTIONS OF ALCOHOL

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THE treatment of lobar pneumonia still remains a difficult problem in spite of the hordes of research workers toiling devotedly in this field all over the world.

So far, the sheet-anchor of the pneumonic patient has been good nursing and rest, drugs having persistently failed us. It is gratifying* to know that digitalis is so little used nowadays by the modern physician to combat heart failure in pneumonia. Morphia is still a great friend of the physician but must be used cautiously; its administration after the third or fourth day of the disease is the surest means of hastening a fatal issue.

Oxygen therapy has been advocated for the relief of cyanosis, and various methods of administration, including elaborate oxygen tents, have been invented, but one doubts its material benefit once the cyanosis is marked. Even its early administration, when the cyanosis is very slight, has not reduced the mortality appreciably in our experience. Those who have any experience in pneumonia know how futile all these measures prove once a patient starts going down hill.

Anti-pneumococcal serum has not given the good results at one time expected of it, and the expense entailed in its preparation forbids its general use. Recent work by Sutcliffe and Finland (1934) shows the application of specific serum therapy to pneumonia to be even more limited than was previously supposed. These authors state that serum can only be employed to any purpose in one out of ten cases suspected of pneumonia.

Modern research has therefore utterly failed to solve this difficult problem, and to give the physician a weapon wherewith to combat this dreaded disease. For most of us the issue depends upon good nursing and the hope that no complication will occur.

The oral administration of alcohol in the treatment of pneumonia has been practised since time immemorial. Medical opinions still differ as to its efficacy. While we do not hesitate to give small doses of brandy or champagne to a case of failing heart we believe that the routine administration of alcohol in pneumonia, although rendering the restless patient momentarily peaceful, does more harm than good by

*[Note.—At the risk of disappointing our contributors we feel that we must point out that, despite recent criticism of the use of digitalis in pneumonia, there are still many excellent physicians who still use digitalis in pneumonia and consider it of great value. EDITOR, I. M. G.]

lowering his resistance on account of its specific action on the liver cells.

Intravenous alcohol has been used by various European physicians in a variety of diseases, such as cancer of the lungs, puerperal sepsis, subacute endocarditis, but it was Landan, Feigin and Bauer (1931) who first used it in pulmonary suppurations. Their theory was that intravenous alcohol, instead of being taken up by the liver cells and detoxicated, as in oral administration, went straight to the right side of the heart from whence it was taken by the pulmonary circulation to the lungs. The curative effect of alcohol in their cases of post-pneumonic pulmonary suppuration was due, in their opinion, to the selective affinity of alcohol for the reticulo-endothelial cells in the pulmonary tissue, where it exerted its bactericidal power. They gave small doses of insulin to protect the liver from any damage which might be done by an overflow of alcohol from the pulmonary circulation.

We first tried this treatment on a case of pulmonary abscess complicating pneumonia, and the result was so satisfactory that we were curious to know what effect intravenous alcohol would have on an uncomplicated case of lobar pneumonia. We believe that this is an experiment hitherto untried by any other workers.

Technique of injections

We employed, in the cases quoted, a solution of 20 per cent alcohol in sterile normal saline. The dose used varied from 20 c.cm. to 25 c.cm. per day, in the average-sized patient. We later found that the strength of the solution could be increased to 33 per cent without causing any more reaction than previously. In only one case did we have to give two injections of 12 c.cm. and 10 c.cm. per day on account of constant rigors which single doses of 20 c.cm. produced. In all the other cases the reaction to the injection was slight, and limited to a feeling of chilliness about 20 minutes to three-quarters of an hour after the injection.

Subcutaneous infiltration due to faulty technique in puncturing the vein produced momentary pain running up the arm. Slight induration without suppuration at the site of injection was the only sequel we observed when by mischance the needle either slipped out of the vein or transfixed it.

Case records

Case 1.—G. H., recruit, aged 18, admitted for pain in the right chest, cough and fever of one day's duration.

Condition on admission.—Temperature—101° F., pulse—102, respiration—24, general condition good, alae nasi working. Cyanosis—nil. Lungs—impaired percussion note over the back of the right lower lobe with pleuritic rub over the eighth rib in the right mid-axillary line, with diminished air entry, broncho-vesicular breathing and sub-crepitant râles. Sputum—tenacious and rusty.

Treatment.—Saline aperient, Dover's powder at night for the first three days. Cataplasma to the chest and sedative expectorant mixture.

2½ inches by 1½ inches over the back of the left lower lobe. Painful cough had developed with rusty sputum containing numbers of pneumococci. Alæ nasi working with slight dyspnoea; no cyanosis; white blood cell count 12,600 (poly. 78 per cent, lympho. 18 per cent, l. mono. 3 per cent, eosin. 1 per cent).

Treatment.—Twenty-one cubic centimetres of 20 per cent alcohol solution injected intravenously. Some coughing occurred during the administration of the alcohol, but a few minutes later the patient said that the pain had gone from his chest and he was feeling sleepy. On waking an hour later, the patient had no pain in either abdomen or chest, and his cough was markedly less irritating. The patient slept well that night.

1st May. Twenty-two cubic centimetres of 33 per cent alcohol solution administered. A slight rigor took place 20 minutes later. The patient had an excellent night.

2nd May. Lung signs remained unchanged, without any increase in the area of consolidation previously mentioned. The injection of alcohol (33 per cent) was repeated. The rigor was this time very slight. The physical signs diminishing; previous patch of consolidation is now occupied entirely by râles, and the breath sounds are becoming vesicular.

3rd May. The patient himself asked for his injection this morning, stating that he wished the injections continued as he felt so much better after the previous one. The injection was repeated.

4th May. The condition much improved, dyspnoea has disappeared. The signs of consolidation and râles have now completely disappeared. There is no cough or sputum. Injections continued daily with further improvement in the general condition. White blood cells—10,400.

6th May. The temperature rose only to 99°F.

8th May. The temperature normal. The patient sitting up with no signs in the chest or abdomen.

A rapid and uneventful convalescence followed.

Case 6.—R. S., Sepoy, aged 18. Admitted on 16th May, 1935. Sudden onset of pain in right chest twelve hours previously with cough and fever. Temperature—104°F., pulse—120, respiration—30. General condition good. Dyspnoea moderate; no cyanosis; signs of early pneumonic congestion in right lower lobe of lung; cough dry and painful without sputum. No apparent abnormality in the heart. Urine:—acid, specific gravity 1025, albumin ++, deposit containing a few white blood corpuscles and red blood corpuscles with some granular casts; no sugar or other abnormality present. Blood slide for malarial parasites negative. White blood cells—27,000 (poly. 75 per cent, lympho. 20 per cent, l. mono. 3 per cent, eosin. 2 per cent). Total red blood cells 4,287,500, hæmoglobin 80 per cent, colour index 0.9. Symptomatic treatment was instituted.

18th May. Condition the same. Sputum rusty, thick and tenacious.

19th May. Chest pain worse, cyanosis evident, signs of consolidation have appeared over the back of the right lung; character of the urine unchanged.

Treatment.—Injection of alcohol (20 c.cm. of 33 per cent) commenced. Slight coughing occurred during the injection but no rigor. The effect was dramatic, the pain in the chest disappearing and the patient falling soundly asleep within two hours of the injection. He had a peaceful night with a good deal less dyspnoea.

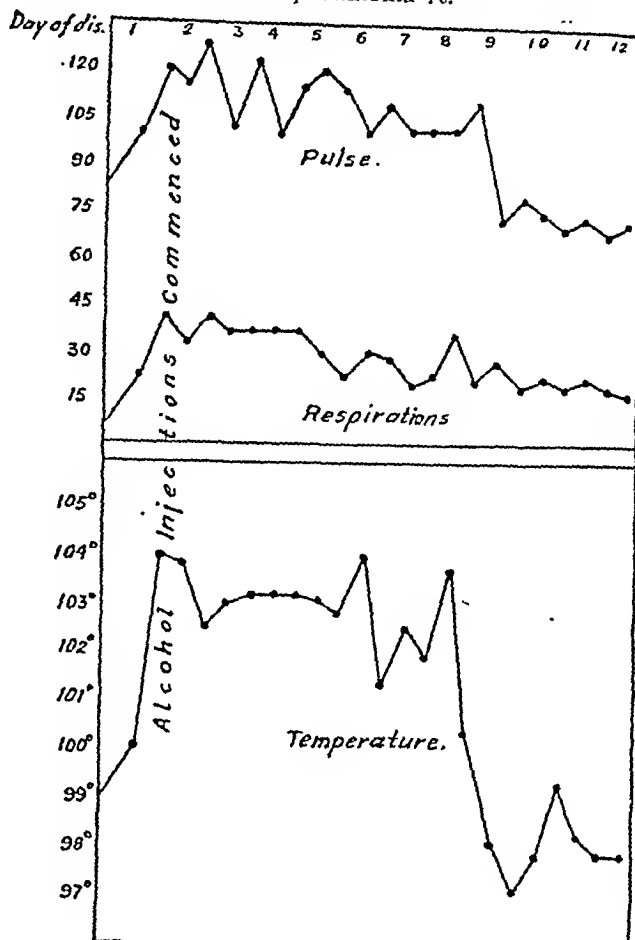
21st May. Cough and sputum practically negligible. Urine total quantity 29 ounces, alkaline, specific gravity 1031, albumin nil, casts a few, number very much decreased. No red blood nor white blood corpuscles. Injections of alcohol continued daily without any reaction such as rigors or coughing.

22nd May. Sleeping well and feeling well with very little cough. Lung signs remained unchanged. White blood cells—12,400. The albumin reappeared in the urine in very slight quantity, but no other abnormal content.

23rd May. Crisis occurred with further improvement in the general condition.

24th May. Urine clear of albumin.

Case 6, Sepoy, R. S. Admitted 16th May, 1935.
Lobar pneumonia rt.



25th May. A slight rising of temperature to 99.4°F. but the progress otherwise very satisfactory.

26th May. Resolution is rapidly taking place. From this date on no more injections were given, and convalescence was rapid and uneventful.

Discussion

The first case, one of pulmonary abscess, is included in this paper because it was our first case in which intravenous alcohol was tried. The results were so encouraging in a case which was clinically in a very bad condition that we were of opinion that perhaps, by early institution of alcohol treatment in all cases of pneumonia, we might avoid many of the complications of this disease.

In connection with the subject of alcohol intravenously administered in pneumonia, one of us (A.) calls to mind a case of double pneumonia, treated last year. The patient had arrived at its eleventh day with consolidation present in both lungs with bubbling râles, temperature—104°F., pulse—130, irregular and of low tension, respiration—55, cyanosis marked with cold sweating extremities, with no signs of a crisis or resolution by lysis being about to take place. All the signs of impending dissolution were present; the patient was severely toxic, and delirium had been present for three days. The urgent question of treating the patient had

to be faced. An intravenous injection of glucose 10 per cent and brandy half an ounce in about 50 c.cm. of sterile normal saline was given twice during the eleventh day, and once on the twelfth and thirteenth days. The effect, which we at that time ascribed to the food value of the injection, was dramatic. The patient became quiet, the respiratory distress was relieved and, after a slight rigor, the temperature began to fall, and continued to fall until it reached normal on the thirteenth morning. The patient had, by this time, quite regained his normal mental state and from then on made a good recovery.

We now think, in view of the six cases quoted above, that the beneficial effect of the injection in this apparently hopeless case was due not to the food value so much as to the specific action of the alcohol.

We think the following points worthy of note. Some of these are difficult to describe on paper but were so striking clinically that they must be recorded.

(a) *Pain*.—Within an hour of the injection, in every case, there was sufficient decrease in the intensity of the pain in the chest to allow the patient to sleep comfortably. It had completely disappeared within 48 to 72 hours of the first injection.

(b) *Cough*.—After slight stimulation during the injection in some cases, there was steady decrease in the coughing. This was accompanied by a change in the character of the sputum. There was a decrease in the amount and a change from thick, rusty, pneumonic sputum to clear non-viscid watery matter within two to three days of the first injection. In those cases where injection was begun before the sputum had become rusty, it never developed this character, but very soon became watery and easy to expectorate.

(c) *Dyspnoea and cyanosis*.—Cyanosis remained entirely insignificant throughout the course of the disease in those cases where the injections were commenced from the first or second day of disease. In the majority of cases, the respiration rate was lowered and the dyspnoea much reduced.

(d) *Pulse rate*.—The pulse rate was slightly lowered and, in case 3, it remained surprisingly low considering the temperature, rarely rising above 88 for a temperature of 102°F. In case 6, which was complicated by acute nephritis and the treatment with alcohol was not commenced until the fifth day, the pulse remained well below the 110 level after that day.

(e) *Temperature*.—There was a rise of temperature more or less, after each injection, the rise being less and less as the patient's condition improved. It was remarkable, however, that the temperature remained raised until the crisis occurred at the eighth or ninth day, just as in an untreated case of pneumonia, although perhaps the general height of the temperature

was not so high as it would have been otherwise.

(f) *Consolidation*.—Arrest of the process of consolidation in these cases treated from the start of the disease was a most remarkable and outstanding feature. The congestive stage gradually regressed, so that by the time the crisis occurred the involved lobe was almost free from any signs of pneumonia. In cases 2 and 6, where alcohol was not commenced until the fifth day of the disease and where consolidation had already set in, the rapid resolution was noteworthy. Resolution in a non-alcohol-treated case takes from 12 to 15 days to be completed, whereas in these cases it was complete before the second day after the crisis.

(g) *The leucocyte count*.—Except in case 2, where the count rose from 8,500 to 12,800 after the first injection, there was a gradual decrease running parallel with the regression of the lung signs and the improvement in the general condition of the patient.

(h) *Course of the disease*.—In cases 2 and 6, where the injection was given on the fifth day of the disease, the crisis occurred on the eighth and ninth days, respectively. In cases 3, 4 and 5, the injections were commenced on the second day of the disease and the crisis occurred on the 8th, 9th and 8th days, respectively. Thus the course of the disease, from the rise of temperature on the first day to the fall on the eighth or ninth day by crisis, was the same in cases treated with alcohol, in those partially treated with alcohol, and in those not treated at all by alcohol. The complications, i.e., lung abscess and acute nephritis, were beneficially affected by the alcohol.

(i) The subjective condition of the patient was immediately changed from that of the acute distress of the pneumonic patient to one of ease and sleep. The patients themselves so felt the benefit of the injections that they themselves asked for their injections, looking forward to the relief which always followed each injection and which increased from day to day.

Although no conclusion can be drawn or hypotheses offered we feel that we have to hand a new method for the treatment of pneumonia worthy of further investigation and trial.

As cases occur so we are continuing our investigations and hope that in the near future we shall have available necessary arrangements in order that certain collateral laboratory investigations may be undertaken.

The above treatment is now being applied by one of us to post-anæsthetic and post-operative lung complications.

Summary

A new method of treatment for pneumonia is put forward, six cases are described, and the effect of intravenous alcohol, as observed in these cases, is discussed.

(Continued at foot of next page)

ATEBRIN TREATMENT IN MALARIA

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As medical practitioners who have used the new synthetic drug, atebirin, in the treatment of malaria, both parenterally and orally, since January this year, we feel we would be doing a service to the public, and to the profession, by reporting our experiences with it.

We have a large outdoor practice, both amongst villagers and town residents; in the former case, we are not able to follow up all our treatments, but we receive confirmation of the good results of the atebirin treatment, from the attendances at the dispensary and requests for injections of the drug, from villagers coming from the same locality as those who have already been treated. In the case of town patients, and pupils of colleges and schools, we keep in touch with them all, and are able to confirm the good results that have followed.

In other cases, where we cannot maintain personal contact ourselves, we have the statements of friends of our patients, so that, on the whole, we exercise a certain amount of control over as large a number of cases as private practitioners can hope to do.

Since January this year we have treated over 3,500 cases by injection with atebirin di-hydrochloride, or atebirin musonate. In this series we have not had a single case of collapse after injection, and no deaths attributable to the drug. Cases of mental excitability after treatment with the drug have been extremely rare, about five per thousand. In such cases the condition is readily controlled by sedatives, such as the bromides and chloral, and eliminants such as citrate of potash, combined with glucose administration; but in view of the fact that we have seen mental excitability approaching insanity, as a result of malaria, in cases which have had neither atebirin nor quinine, we cannot solely attribute this symptom to the use of atebirin. Occasionally, patients complain of

(Continued from previous page)

The main effects are:—

Pain and cough are immediately relieved.

The consolidation is arrested and regresses.

The patient's distress vanishes and he sleeps well, and

The 'defences' of the body are apparently not interfered with.

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Sutcliffe, W. D., and Finland, M. (1934). *New England Journ. Med.*, Vol. CCX, p. 237.

bad headaches after the drug, also restlessness and insomnia following the first injection, which symptoms disappear after the second injection. In a few instances, we have noticed plentiful crops of sudamina with itching of the skin, all of very temporary duration, till satisfactory excretion of the drug takes place, as evidenced by the discoloration of the urine. Instances of irritability of the stomach and vomiting of bile have occurred after oral treatment, but this we cannot put down to the use of atebirin, as these disabilities arise in cases of malaria treated with other drugs, or in untreated cases, in forms known as the 'bilious remittent', and algid types. We are of opinion from our prolonged use of atebirin, that any temporary disabilities, such as we have mentioned, are more than counter-balanced by the dramatic results obtained from its use. In our experience both salts have proved extremely efficacious, but we have used somewhat smaller doses than those advocated, and in all cases we have supplemented the parenteral treatment with subsequent oral administration.

As to dosage, we use for male adults injections of 0.15 gramme of the di-hydrochloride, and repeat this dose in 24 hours. This is followed by oral treatment of two tablets a day for six days, bringing the total of atebirin administered to 22½ grains (1.5 grammes) for the whole course, which is equivalent to a tablet taken three times a day for five days, as recommended by various writers.

In the case of females, or weak and debilitated males, we use two injections of 2½ tablets each of the di-hydrochloride and follow it up with ten tablets orally, two a day for five days. We have found this sufficient in the great majority of cases to prevent relapses. Previously-treated patients do come back at intervals of 5 or 6 weeks with a return of temperature but in view of the fact that they reside in heavily-infected localities, the probabilities are that they have been re-infected. It is not possible to make blood examinations of all cases in a dispensary practice, but we have often followed up our injection treatment by examining blood films after the second injection. We have rarely seen any ring forms after the third or fourth day and any such appeared in fragmentation, of quarter and half rings. After the fifth day, even after an excitant injection such as adrenalin, we have failed to discover parasites in the blood.

Blazé and Simeons, in their paper in the April number of the *Indian Medical Gazette*, assess the curative dose at 9 grains (0.6 gramme) and while this may be perfectly correct from the view-point of mass treatment, it would not appear to meet the needs of private practitioners in our position. In nearly all the instances in which we have given the drug in the doses prescribed by these writers, we have had our patients coming back after 10 to 14

days with relapses or re-infections. This has led us to supplement the parenteral treatment with the oral, up to $22\frac{1}{2}$ grains, which seems to confer an immunity for at least a month and in many cases for a much longer period; this is all that can be expected with patients living in heavily-infected areas.

A total dosage of $22\frac{1}{2}$ grains seems to be a safe limit for adults, although in resistant cases we have increased the dosage by 9 grains, prolonging the treatment accordingly. Whether occasional resistance is due to the inability of the patient to produce antibodies, or to the recalcitrant nature of a certain type of parasite, we cannot say. In a few cases which did not respond to atabrin we have not hesitated to give quinine.

In very few cases where the temperature had not come down after the second injection, we have given a third injection of 4 c.c.m. (2 tablets of 0.75 grain each); but we wish to emphasize the fact that these were rare exceptions, while in a considerably greater number of cases the opposite had occurred, namely, one injection sufficed to reduce the temperature; in these latter cases (where one injection reduced the temperature), there was a good deal of sweating.

In a number of cases where a tonic and stimulant appeared indicated, we have followed up our treatment with 'plasmochin silver tonic' with excellent results. We do not otherwise use plasmochin.

Pregnant-uterus.—We have used atabrin in pregnant cases with the happiest results. Uterine contractions and premature labour, as observed after the administration of quinine, were entirely absent.

Spleen.—The effect of atabrin in large-spleens is truly remarkable.

Kidney.—In a case of pyelitis, with blood and pus in the urine, atabrin was injected, owing to a concomitant malaria, with very satisfactory results.

(Continued at foot of next column)

MENTAL DERANGEMENT IN MALARIA CASES TREATED BY ATEBRIN-MUSONATE INJECTIONS

By LYN UDALAGAMA

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MENTAL excitation, psychoses and other forms of temporary insanity following the oral administration of atabrin have been described by various writers, including Kingsbury (1934). Disordered mental conditions are now well recognized sequelæ of the treatment of malaria

(Continued from previous column)

Pain and abscess.—Pain at the site of injection is negligible, and most patients never complain at all. We have, in our series of cases, never had an abscess, nor has a single case of tetanus occurred. We may mention that we have used atabrin injections on a child 21 days old, with a very large spleen; complete recovery followed.

Cerebral cases.—Cases of cerebral malaria, brought in in an unconscious condition, have responded marvellously to intravenous injection, two tablets of the di-hydrochloride being found sufficient to effect a return to consciousness.

Toxicity.—As regards the toxic effects of the drug, we would like to cite one case we had, in which after an injection of 0.15 gramme of the di-hydrochloride, the patient confessed to the doctor that he had already swallowed 10 oral tablets on that day, in his desire to shake off the fever quickly. He suffered no ill-effects from the big dose and was at his work the next day.

As regards atabrin musonate, we use a smaller parenteral dose than that used by Blazé and Simeons. We give adults parenterally half the quantity recommended by them, and follow it up with oral treatment to bring the total dose up to $22\frac{1}{2}$ grains (1.5 grammes). The following is the table of dosage adopted by us:

	Hydrochloride			or	Musonate			plus Oral treatment following either		
	Number of injections	Number of tablets in each injection	Total in grains		Number of injections	Number of ampoules in each injection	Total in grains	Tablets daily	Days	Total grains by mouth
Adults ..	2	3	$4\frac{1}{2}$		2	$1\frac{1}{2}$	$4\frac{1}{2}$	1×2	6	18
Children—										
up to 1 year ..	2	$\frac{1}{2}$	$\frac{3}{4}$		2	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$		
1 to 2 years ..	2	1	$1\frac{1}{2}$		2	$1\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	6	$4\frac{1}{2}$
2 " 3 " ..	2	1	$1\frac{1}{2}$		2	$1\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	5	$3\frac{3}{4}$
3 " 5 " ..	2	$1\frac{1}{2}$	$2\frac{1}{4}$		2	$2\frac{1}{4}$	$2\frac{1}{4}$	$\frac{1}{2}$	8	6
5 " 8 " ..	2	2	3		2	2	3	$\frac{1}{2} \times 2$	6	9
8 " 10 " ..	2	2	3		2	2	3	$\frac{1}{2} \times 3$	5	$11\frac{1}{2}$
								1×2	5	15

with atabrin tablets, and numerous cases have been seen in Ceylon during the recent epidemic. The onset of the symptoms generally occurs towards the end of, or immediately after, the usual course of 15 atabrin tablets, *i.e.*, after 1.2 to 1.5 grammes of atabrin have been taken by the patient.

Atabrin musonate became available in Ceylon towards the end of April 1935. The standard form of treatment with this preparation, for an adult patient suffering from malaria, is two intramuscular injections each equal to 0.3 gramme of atabrin, with an interval of 24 hours between injections.

It was hoped, in view of the much smaller dose of atabrin given parenterally, 0.6 gramme as contrasted with 1.5 grammes when given orally, that many of the unpleasant effects of atabrin by mouth, such as headache, abdominal pain, and staining of the skin, would be avoided and that mental symptoms also would be absent. Unfortunately this has not proved to be the case and the following description, therefore, of seven cases of temporary mental derangement which developed in a series of 644 cases who received injections of atabrin musonate at a field treatment centre at Narammala, between the 21st and 30th May, 1935, is of interest. The patients were villagers who for several months previously had been suffering from attacks of malaria and many of them had fever when the injections were given. Blood examination in the area, shortly before the treatment was started, showed that approximately 80 per cent of the malaria was benign tertian and 20 per cent subtertian.

To avoid any possibility of accident all the patients presenting themselves for treatment were carefully examined and only selected patients received the injections. Patients who gave evidence of nephritis, advanced hookworm disease, toxæmia associated with pregnancy or who were very debilitated or anæmic were treated by other means. All patients were given food before and after injections and rested for an hour or so before returning to their homes. I have to thank Dr. D. B. d'Alwis, the inspecting medical officer, Central Province, to whom it was my privilege to have been associated in the field treatment with atabrin musonate of 644 patients, and also to thank the Director of Medical and Sanitary Services for the kind permission given to me to publish the records of these cases.

Case 1.—U. B. male, aged 12 years.
Last injection at about 10 a.m. on the 28th May, 1935.

Onset of mental symptoms at about 12-30 p.m. on the same day, *i.e.*, about 2 hours later.

Duration from 12-30 p.m. on 28th May to 6 a.m. on 29th May, *i.e.*, about 17 hours.

Nature of mental symptoms.—Restlessness, irrational speech and behaviour, abusiveness, loss of memory.

Dose of atabrin musonate.—0.2 gramme in one injection.

Detailed history.—He left his residence at about 8 a.m. after a morning meal of rice. He walked about a mile to the centre where the injections were given. At the centre he had a bowl of *conjee* before the injection and a bowl of soup after. He was also given sweets after the soup. While at the centre he did not feel anything unusual. He waited here about an hour before starting back to his home. When he was about 100 yards from his residence, at about 12-30 p.m., he felt giddy and faint. He had no heaviness of the head nor headache at the time. From the time he felt giddy to the time he arrived at the rest-house at about 4-30 p.m. his memory is a blank. He remembers nothing whatever that took place during this interval. I questioned the Buddhist priest with whom the child lives as to the condition of the child during this time. According to him he was very restless, running about the compound, abusing people, not recognizing his relations nor his friends, spitting on people and refusing food. The priest tells me that it was with great difficulty that he was able to restrain the child. The child was brought before us at about 4-30 p.m. at the rest-house. The boy remembers only the rest-house. He walked through the bazaar but does not remember any part of the journey. At the rest-house when we saw him he was excited but quiet. He was not violent nor did he show any peculiar behaviour. He was given an ounce of chloral and bromide draught to be taken home and given if he became restless again. This was given at bed-time and he had a good night's rest. When he got up the next morning he was perfectly normal and felt nothing unusual. The child remembers all the incidents from the time he came to the rest-house at 4-30 p.m. till he went to bed. He was quiet and nothing unusual occurred from this time onwards. There was no family history of insanity, epilepsy nor anything of note. Personal history—nothing of note.

Case 2.—M., female, aged 8 years.
Last injection given at 12 noon on the 21st May, 1935.
Onset of mental symptoms at 3-30 p.m. on the same day.

Duration from 3-30 p.m. on 21st May to the morning of 23rd May, *i.e.*, about 36 hours.

Nature of mental symptoms.—Delirium, headache, restlessness, excitement, incoherent and incessant speech and irrational behaviour.

Dose of atabrin musonate.—0.16 gramme on 20th May; 0.16 gramme on 21st May.

Detailed history.—This child was an inmate of the temporary hospital receiving treatment for malaria. She had been here on several occasions. After the second injection of 0.16 gramme of atabrin musonate given on the 21st May she developed a high temperature at about 3-30 p.m. We saw her at 4 p.m. and found her in a delirium. She complained of a severe headache, the eyes were injected, she was restless, and talking peculiarly and incoherently. Her face was flushed. She was quiet but

muttering the whole time. The next morning her temperature subsided but her behaviour was still peculiar in that she used to laugh at nothing, and look at people with a coquettish look. She was disobedient. The very next day all these symptoms subsided and she was normal.

Case 3—A. N., female, aged 25 years.

Last injection given at 11 a.m. on 21st May, 1935.

Duration from 12 p.m. the same day to 6th June, i.e., 17 days.

Nature of mental symptoms—Complete loss of memory, no maniacal symptoms at all, indifference to her surroundings and her own children, fainting giddiness, heaviness of head, incoherent and incoherent speech.

Dose of atabrin musonate—0.3 gramme on 21st May; 0.3 gramme on 22nd May.

Detailed history.—The injection was given about 11 a.m. after a bowl of *congee*. She also had a bowl of soup after the injection. She stayed here for about an hour before she started for her residence. The distance she had to cover was about 2 miles to her home after the injection. When she had gone about a quarter of a mile she felt giddiness and general weakness, and she noticed that she was swaying from side to side like a drunkard. She felt worse on her arrival at home and went straight to bed. She did this because she felt so bad that she couldn't even raise her head.

The giddiness was extremely severe at this time. Later she was informed by her relations that she behaved peculiarly after she went to bed in that she talked incoherently, laughing at nothing and for no reason at all. This cleared up the next morning and she came back for her second injection. After her second injection up to the time of her departure for her native place at Kukulnape, which was three days later, she had only heaviness of head and general weakness of her lower limbs. While she was at her native place she was dazed, indifferent to her surroundings, uninterested in her own children and relations when they spoke to her. She couldn't think for herself. Even at this time her appetite was good. There was complete loss of memory of past events. This state lasted for about 5 days. Then she started bathing and applied some oil to her head. This was done for about 8 days. Gradually her heaviness of head and loss of memory disappeared from the time she started bathing. At the end of 8 days she found herself normal once again in her head. She has no complaints now. There is no family history of insanity, epilepsy or any other nervous disease, nor any alcoholic history.

Case 4—J. F., male, aged 45 years

Last injection given at 11 a.m. on the 24th May, 1935. Duration from 8 p.m. on 26th May to 7th July, i.e., 1 month and 11 days.

Nature of mental symptoms—Giddiness, lack of concentration of mind, sleeplessness, loss of memory, delusions, abusiveness, violent, maniacal delirium.

Dose of atabrin musonate.—0.3 gramme on 23rd May; 0.3 gramme on 24th May.

Detailed history.—The injection was given at about 11 a.m. after a bowl of *conjee*, and a bowl of soup was given after the injection. He rested here for about half an hour before he left for his home which is about half a mile from the centre. In the morning when he came for the injection he had a cup of tea with 'hoppers' at about 8 a.m. On his return he had no midday meal but had a meal at about 4 p.m. On the 24th May he was perfectly normal. The next day, he had a bath at about 11 a.m. followed by a midday meal and rested for a time in bed. He got up at about 4 p.m. and felt a constriction in the sides of the neck (over the sterno-mastoid muscle and the posterior part of the neck). He felt giddy and saw everything around him turning round and round. His vision was blurred. He rubbed some oil on the neck and head and felt a little better. Then he started writing a charm which is his normal vocation. In this he made some mistakes which he says never happened in his experience before. He made a second attempt and found mistakes in this also, according to his judgment at the time, and he put this off to the next day. He had his evening meal at about 6 p.m. and went to bed at about 9 p.m. He could not sleep at all that night. He walked about the house the whole night because the constriction in his neck was increasing. He applied the medicinal oil again. Still sleep would not come. He heard the cock crow. Then he fell off to sleep and was asleep till about 8 a.m. He got up and had his morning tea. He took up his work again but found he could not do it as he couldn't concentrate his mind on the work. He was still feeling giddy and, thinking it would pass off, he bathed a little longer than usual. He had no midday meal. This was on the 26th. He had only a cup of tea that day till his evening meal which was taken at about 4 or 5 p.m. After his meal he came to the bazaar to earn a few cents for the next day and returned home at about 7 p.m. The lamps in the house were lit at the time he returned. A little later he refused a plate of rice given him by his wife as he thought the *sambol* would not agree with these injections he had had, and so had a cup of tea instead and retired to bed. His story from here onwards is very inaccurate but he remembers occasional incidents that took place. He remembers the police arriving and taking him to the station. His memory seems to be very poor from that evening after he retired to bed. The narrative of the events from this time onwards is taken from his wife who lives with him. After about 2 minutes of his retiring to bed he got up and went for a call of nature. He returned to bed again and got up after about 10 minutes and answered a call of nature once again in the sleeping room itself. This had never been done before. Then he called for a chew of betel. He started talking incoherently and incessantly.

He started chanting something which could not be understood. His wife questioned him as to what was the matter. She wanted to open the door to get some help but he would not allow it and threatened to kill her if she opened it. His attitude towards his wife and children was peculiar in that he wanted them to do various purposeless things such as laugh at nothing, sing, dance, etc. He became uncontrollable and violent. The noise in the house at that hour attracted the attention of the people living near about and they informed the police. The police arrived immediately—it was about midnight—and took him to the station. He has a vague idea of his coming to the police station that night. He was taken before the district judge of Kurunegala the next day and remanded to the 'house of observation'. This was on the 27th. Late in the evening when we heard of it Dr. d'Alwis and I went immediately to see him in the Kurunegala police station awaiting removal to the house of observation. He was most violent, abusive and talkative. He refused to take any meals or drink anything. He had delusions that some people had done him a great injustice. He recognized Dr. d'Alwis at once. His memory to all these happenings is a complete blank. The next thing he remembers is the 2nd of June in the house of observation. He says he remembers it because he saw it in big figures on the wall calendar. From that time onwards his memory gradually came back. Now he is normal once again but one looking at him would notice that he is not still what a normal person should be. He denies any history of insanity, alcohol, addiction to opium, ganja or legium.

Case 5.—S., male, aged 30 years.

Last injection at about 10-30 a.m. on the 23rd May.

Onset of mental symptoms at about 12 noon on the same day, i.e., 1½ hours after.

Duration from 12 noon on 23rd May to date.

Nature of mental symptoms.—Giddiness, loss of memory, incoherent speech, irrational behaviour, irritability of temper, melancholic and sentimental.

Dose of atabrin musonate.—0.3 gramme on 22nd May; 0.3 gramme on 23rd May.

Detailed history.—The patient had his bowl of *conjee* before the injection which was given at about 10-30 a.m. on the 23rd May and a bowl of soup after. After the injection he rested at the centre for about half an hour before starting back for his home. He had to walk about 5 miles to his village. When he had gone about 3½ miles he went to a *boutique* and had some bread and tea. He left the *boutique* and went about half a mile when he felt giddy, and a general weakness overtook him and there was a humming noise in his ears. He arrived at his home at about 1 p.m. He went straight to bed as he felt ill and weak. The giddiness and weakness and the humming noise in his ears was increasing fast. When he was in bed he felt that he was becoming worse. He started a rigor. He attempted to drink

some water which he could not do, due to his condition at the time. He felt his whole body drawn up and found difficulty in breathing. Then he felt he was becoming unconscious. He couldn't hear or understand what was happening around him. He is unable to say how long he was in that condition. He was unaware of the people going in search of the doctors at Naram-mala. He does not remember acting strangely, running about the place, talking incoherently and refusing food. His memory is blank to these incidents. After some time he became gradually conscious to what was happening around him. When Dr. d'Alwis visited him at about 10 p.m. he was quite conscious. He remembers his visit. He had no sleep at all that night. He cannot account for it. Then the next morning he had a severe headache, this had been only mild the previous evening, heaviness of head, blurring of vision. He is very irritable and loses his temper for the slightest thing. Brooding over his troubles which are non-existent, the whole day and night; his powers of assimilating anything read is greatly diminished. His affection and anxiety towards his children has greatly increased. He has become very sentimental. Even now in my presence he started crying for no apparent reason. He is very morose and melancholic. He has not made much improvement in his mental condition even to date. He was not violent at any time. He has delusions that a great calamity has befallen him and his family.

Family history of epilepsy in his mother.

Personal history.—History of *parangi* when he was a boy for which he received *salvarsan* during the time of the *parangi* campaign. He has taken two injections of N.A.B. at the Negombo hospital during the course of the last two weeks and he feels much better generally, including his mental condition, since then.

Case 6.—L., male, aged 57 years.

Last injection on the morning of the 21st May, 1935.

Onset of mental symptoms on the evening of the 21st May; was admitted in a collapsed state to the temporary hospital.

Nature of mental symptoms.—By the 28th May, the patient was admitted to the Dambadeniya hospital in a dazed condition. He was indifferent to his surroundings according to the D. M. O., Dambadeniya. He was conscious but answered questions with great difficulty. He died after a few days of his discharge from the hospital from mere exhaustion. He also developed an abscess on the right gluteal region.

Dose of atabrin musonate.—0.3 gramme on the 21st May; 0.3 gramme on the 22nd May.

Case 7.—P. A., male, aged 35 years.

Last injection at about 10 a.m. on the 27th May, 1935.

Onset of mental symptoms at about 10-15 a.m. on the same day; duration about 8 days.

Nature of mental symptoms.—Giddiness, loss of vision temporarily, sleeplessness, loss of memory, indifference to his surroundings, lack of concentration of mind, unable to think, forgetfulness. He was violent and abusive.

(Continued at foot of opposite page)

THE ETHERINGTON-WILSON TECHNIQUE OF INTRATHECAL NERVE-ROOT BLOCK

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SINCE the appearance in February 1934 of an article by Etherington-Wilson in the proceedings of the Royal Society of Medicine, on a new and rational technique of spinal anaesthesia, I have studied the method, and applied it to all cases where spinal anaesthesia was used.

For more than a year have I waited for the appearance of an article giving the experience of some of the leading surgeons with this method, but I have waited in vain; it is for this reason that I am putting forward my own very small experience with the method.

Those of us practising surgery in the tropics, where anaesthesia is a difficult problem, on account of the shortage of good anaesthetists, the temperature, the usual bad condition of the patient coming to operation, and other factors, realize the importance of having always to hand a reliable, rational and easily controlled method of spinal anaesthesia.

In the short series of cases appended I have found the above method to fulfil all the claims made for it, and for this reason perhaps these few notes will be of use.

Technique (after Etherington-Wilson)

The principle involved is simply to allow a light solution to ascend the vertical spinal canal, timing it to reach certain levels.

Etherington-Wilson found by experiment that the rate of ascent of a hypobaric solution in a normal vertical spinal canal from the third lumbar space to the fourth dorsal vertebra was the same as in a glass tube containing cerebro-spinal fluid and of equal length and bore.

Thus the solid contents of the spinal canal have approximately the same braking effect, as the greater amount of cerebro-spinal fluid in the glass tube has, by reason of the greater mixing, and the consequent approximation of the baric properties, of the two fluids.

In general the three types of spinal anaesthesia required are:—low—from the needle in the third lumbar space to the first lumbar nerve rootlets, medium—from the needle in the third lumbar space to the tenth thoracic nerve rootlets, high—from the needle in the third lumbar space to the fifth thoracic nerve rootlets. It

(Continued from previous page)

Dose of atebirin masonale.—0.3 gramme on the 26th May; 0.3 gramme on the 27th May.

REFERENCE

Kingsbury, A. N. (1934). Psychoses in Cases of Malaria following Exhibition of Atebrin. *Lancet*, Vol. II, p. 979.

is sufficient to know whether the individual is short, five feet or less, average height, five feet eight inches to five feet ten inches, or tall, six feet and over. The average distances for these three types of anaesthesia are six inches, nine inches, and 13 inches respectively, and one inch added or subtracted, as the person is tall or short, supplies the corrected distance which the fluid must travel to produce the given type of anaesthesia.

As a result of his studies he states: 'It does not seem possible that a light solution like pereinine can ever reach the higher subarachnoid spaces by direct ascent, in an intelligently conducted procedure. I am convinced that after the adoption of the Trendelenburg position of ten or fifteen degrees when using pereinine, it is quite impossible for the light mixture of pereinine and cerebro-spinal fluid, which has been allowed to ascend to a certain level beforehand, to diffuse any higher'.

There is absorption of pereinine solution during the whole time that it is ascending the canal. Therefore there is an ever-decreasing amount to ascend higher. The pereinine mixes with the cerebro-spinal fluid and therefore there is the ever-increasing dilution of the pereinine as it ascends higher.

In rough and uncontrolled injections currents are bound to be set up, and these undoubtedly account for many of the cases of failure to obtain the required amount of anaesthesia. With the vertical technique, using slowly-injected pereinine, a steadily rising and well-mixed area travels up the whole length of the spinal canal to the level required without setting up any undesirable currents.

I do not propose to go further into Etherington-Wilson's experimental work; I cannot too strongly recommend those to whom the method may appeal, to read carefully and study the original communication.

Practical details

Apparatus:—20 c.cm. ampoule pereinine, 1:500 solution, 1.003 specific gravity.
20 c.cm. syringe to fit the lumbar puncture needle,
gallipot for pereinine solution,
a basin containing slightly acidified water at 100°F.,
a tiltometer, if available,
sterilized gloves,
small syringe for local anaesthesia, with needles,
intravenous saline apparatus,
ephedrine gr. 1½, carbon dioxide and oxygen, if available, and
Coramine 5 c.cm.

Into the dish of acidified water the large syringe, lumbar puncture needle, and gallipot are put ten minutes before the arrival of the patient.

I have never used a tiltometer, but find that an ordinary pocket protractor serves the purpose.

Preparation

As for general anaesthesia, if there is time, glucose is given liberally up to within two hours of operation. A good sedative should be given the evening before; a basal drug should not be used. The lumbar region should be as carefully prepared as the actual field of operation.

One hour before the operation the patient is placed comfortably on the stretcher or trolley, in a darkened room. The ears are plugged with cotton-wool and an intramuscular injection of scopolamine gr. 1/100 given. Talking to and touching the patient is now forbidden. Deep sleep is to be avoided, only somnolence is required. Occasionally, where necessary, I have given a further dose of scopolamine, gr. 1/200, half an hour later.

Everything must be absolutely ready in the theatre before the patient is brought in. The patient is raised to a sitting position on the edge of the table and an injection of ephedrine gr. 1½ given whilst the surgeon is preparing to do the lumbar puncture.

When working single-handed, I follow the routine here given:—During the patient's last half hour in the darkened room, the theatre arrangements, instruments, etc., are checked. The surgeon scrubs up and prepares himself. The patient is sent for. At the moment of the giving of the injection of ephedrine the gallipot of percaïne is prepared and the large syringe set in order. The novocaine and small syringe are also arranged for local anaesthesia of the skin and deeper structures in the region of the third lumbar space. This gives time for the ephedrine to have effect. The site is prepared with iodine and the local anaesthetic injected. Lumbar puncture is performed; as soon as cerebro-spinal fluid flows the stylet is reinserted and the needle corkscrewed a few more millimetres into the canal to make sure that the injection is into the canal only.

The attendant now makes the patient assume a vertical position, and the percaïne solution is injected at the rate of 10 c.cm. in not less than 15 seconds at a regular speed. At the same time as the surgeon commences the injection he says 'go' and an assistant counts the seconds aloud on his watch, but in a quiet voice. A certain number of seconds are allowed to elapse before the patient is laid down in the Trendelenburg position.

Average doses and times (for operations of approximately one hour)

Low—10 c.cm. percaïne 20 seconds upright.
Medium—12 c.cm. percaïne 30 seconds upright.
High—15 c.cm. percaïne 40 seconds upright.

After the injection has been given and the patient laid in the correct position, the surgeon may again scrub up and change his gown and gloves, whilst waiting for the percaïne to take effect.

It is quite unnecessary to turn the patient, using this method.

There is no fall of blood pressure for 60 or more seconds after the injection of the percaïne so that the vertical position is quite safe for the period required for the solution to mount to the required level.

When the technique has been mastered it is found that much smaller quantities of percaïne can be used and yet the same levels attained.

If the technique laid down above is rigidly followed, consistently good results are obtained.

Failure to obtain the required anaesthesia may be due to:—

- (1) Injecting too cold a solution.
- (2) Not making sure of being in the canal.
- (3) Not acidifying the water in which the instruments are rinsed before use.
- (4) Not waiting a sufficient length of time in the vertical position.

The following is a record of 14 consecutive cases who were anaesthetized by this technique; 1 in 1,500 percaïne solution was used in all cases:

Case 1., aged 48. Many attacks of X-ray showed six stones in gall-bladder. Prepared in usual manner; pre-operation medication with scopolamine. Drowsy when brought to the theatre.

Fifteen cubic centimetres percaïne. Forty seconds in vertical, 10° Trendelenburg with pillow under lower dorsal region.

Kocher's incision. Operation time—28 minutes. Anaesthesia lasted 2 hours 15 minutes. Anaesthesia level—nipple line. Blood pressure: immediately before lumbar puncture (ephedrine already given) 90/140. No fall registered for 4 minutes.

After effects—nil.

Case 2. Perforated gastric ulcer.—C. D., aged 27, admitted as emergency. No history could be obtained, either before or after operation, of any dyspepsia. Twelve hours perforated when admitted. No preparation, apart from subcutaneous 20 per cent glucose solution, 20 c.cm. into each pectoral region.

Twelve cubic centimetres percaïne. Forty seconds in vertical, 10° Trendelenburg with small pillow under each of lower ribs. Right paramedian super-umbilical incision. Operation time—20 minutes. Large perforation with wide indurated, friable area surrounding. Inversion of ulcer not possible. Omental strip graft used to close perforation. Small drain placed in mid-line 1½ inches below umbilicus. Anaesthesia lasted 1 hour 10 to 15 minutes. Anaesthesia level—slightly below nipple line. Pulse remained steady at 110 throughout the proceedings.

Case 3. Stone in left ureter and anuria.—K. S., aged 29. Called to see patient who had pain in left side, of three days' duration. Had not passed urine for more than 12 hours. History of previous attacks of ureteric colic on right and left sides. Removed to hospital. Condition very poor generally, thirst, headache and vomiting. Catheter in bladder produced no urine.

Unprepared except for 50 c.cm., 20 per cent glucose in saline under pectorals.

Twelve cubic centimetres percaïne. Forty seconds in vertical, 10° Trendelenburg position.

Left pararectal. Operation time—1 hour. Anaesthesia lasted 1 hour 20 minutes. Anaesthesia level—about level of seventh rib in front.

After effects—difficult to distinguish between those due to type of anaesthesia and those due to suppression of mine, etc.

Case 4. Ruptured spleen.—G. H., aged 24, admitted to hospital from roadway, where he had fallen whilst getting out of a tonga. Thin, pale individual with much pigmentation of malar regions and tongue edges. Pulse small and very rapid. Respiration—sighing, restless and in pain on left side, under ribs.

Unprepared except for morphia gr. 1/6, saline and glucose 20 per cent 50 c.c.m. under pectoral.

Thirteen cubic centimetres percaïne. Forty seconds in vertical. Left pararectal incision. Splenectomy—large friable, chronic malarial spleen. Much free blood in abdomen. Time of operation—15 minutes. Anaesthesia lasted 1 hour. Anaesthesia level—just below nipple line.

After effects—some itching on the table.

Case 5. Ankylosis right knee.—M. A., aged 38, admitted with severe flexion deformities in both legs due to rheumatoid arthritis. Much wasting of leg muscles. General condition good. No pain in any part of the body. Chest free from disease. Prepared in usual manner for operation on right knee.

Six cubic centimetres percaïne. Twenty seconds in vertical, 10° Trendelenburg position.

Kocher's operation for excision of the knee joint performed. Operation time—35 minutes. Anaesthesia lasted 50 minutes. Anaesthesia level—pubis in front. No fall of blood pressure.

After effects—nil.

Case 6. Septic arthritis left knee.—H. L., aged 30, village coolie, admitted severely ill. Temperature—105, pulse—120, respiration—20. Large fluctuant swelling left knee joint region. Fluctuation extended up to the middle of the thigh. The man had been ill for three weeks, and came for treatment on account of rapid extension recently of painful area of thigh. Immediate amputation through upper limits of left thigh was performed, and the flaps left open. Twenty cubic centimetres anti-streptococcal serum given intravenously before operation.

Six cubic centimetres percaïne solution. Twenty-five seconds in the vertical, 10° Trendelenburg position. Operation time—approximately 20 minutes. Anaesthesia lasted 1 hour.

After effects of anaesthetic—nil.

Case 7. Hydrocele and inguinal hernia.—M. J., aged 29, admitted to hospital and prepared in the normal manner.

Ten cubic centimetres percaïne. Thirty seconds in vertical, 10° Trendelenburg position. Operation time—15 minutes. Anaesthesia lasted 1 hour and approximately 10 minutes. Anaesthesia level—not quite to umbilicus.

No severe fall as pulse remained good throughout.

After effects—nil.

Case 8. Vesical papilloma.—I. M., aged 28, female, admitted for hematuria. Cystoscope showed small apparently non-malignant papilloma to the centre and above right ureter.

The bladder was opened suprapubically and the small growth excised. Patient was prepared in a normal manner.

Ten cubic centimetres percaïne. Thirty seconds in vertical, 25° Trendelenburg position. Operation time—20 minutes. Anaesthesia lasted 1 hour approximately. Anaesthesia level—umbilicus.

After effect—was catheterized twice daily for two days, before power to empty her bladder returned.

Case 9. Prostatectomy.—J. M., aged 58, admitted with retention of urine. After relief an enlarged prostate was found. The patient was prepared for operation in the usual way.

Ten cubic centimetres percaïne. Thirty seconds in the vertical, 30° Trendelenburg position. Supra-pubic prostatectomy performed.

Operation time—35 minutes. Anaesthesia lasted 1 hour.

After effects of anaesthesia—nil.

Case 10. Caesarian section.—M. S., aged 26, admitted during her seventh month of pregnancy with jaundice, oedema of the legs and vulva. Marked albuminuria. Mitral stenosis of long standing. After two weeks of treatment condition improved, but the jaundice never quite disappeared, nor the albuminuria. In view of this, Caesarian section was performed at the middle of the eighth month. A living male child was delivered and the mother steadily improved and was finally discharged cured.

Twelve cubic centimetres percaïne. Thirty-five seconds in the vertical, 10° Trendelenburg position. Anaesthesia level to costal margin. Operation time—20 minutes. Anaesthesia lasted 1 hour 15 minutes.

After effects—nil.

Case 11. Hysterectomy.—M. O., aged 45, admitted for increasing and irregular uterine bleeding. On examination, an enlarged soft uterus was found. No glands palpable. Curettage had had only a very temporary effect upon the bleeding. The patient was prepared and hysterectomy performed.

Ten cubic centimetres percaïne. Thirty seconds in the vertical, 25° Trendelenburg position. Anaesthesia level—umbilicus. Operation time—10 minutes. Anaesthesia lasted 1 hour.

After effects—nil.

Case 12. Intestinal obstruction from band.—G. M., aged 30, female, brought from village on account of persistent vomiting. Patient found with much-distended abdomen, feeble pulse, extremely toxic, not having passed faeces or flatus for 48 hours. Intravenous saline and glucose given, laparotomy performed.

Twelve cubic centimetres percaïne. Thirty-five seconds in the vertical, 10° Trendelenburg position. Anaesthesia level—costal margin. Operation time—20 minutes. Anaesthesia lasted 1 hour.

After effects—nil.

Case 13. Perforated appendicitis.—H. C., aged 23, male, admitted with abdominal pain of two days' standing. The pain disappeared suddenly just after completion of examination of the patient. The patient was not prepared.

Ten cubic centimetres percaïne. Thirty seconds in the vertical, 10° Trendelenburg position. Anaesthesia level—umbilicus. Operation time—25 minutes. Anaesthesia lasted 1 hour.

After effects—nil.

Case 14. Strangulated prolapse of rectum.—K. B., aged 40, male, admitted with large gangrenous prolapse of rectum, apparently caused by large internal piles. Patient was not prepared.

Resection of the gangrenous mass was carried out.

Ten cubic centimetres percaïne. Thirty seconds in the vertical, 10° Trendelenburg position, and lithotomy position.

Operation time—25 minutes approximately. Anaesthesia lasted 1 hour, and reached the level of the umbilicus.

After effects—nil.

I am indebted to the Director, Medical Services, India, for kind permission to publish this article.

A Mirror of Hospital Practice

HYDATID CYST IN THE BROAD LIGAMENT

By SATYAPRIYA NOZUMDAR, M.B. (Cal.)
F.R.C.S. (Eng.)

Honorary Surgeon, Purulia Sadr Hospital

A YOUNG woman, aged 22, nullipara, came to the hospital for treatment of 'lumps in the stomach', of which three were in the epigastric and right hypochondriac regions and a large one in the pelvis. According to her history (and she seemed very definite on this point) the abdominal lumps had been there since she was 5 or 6 years old. The pelvic tumours had been noticed about five months ago, since when she has been having irregular uterine hæmorrhages.

On examination, three abdominal tumours were found, one large, about the size of a small coconut, and two smaller ones. They were fairly movable and connected with each other and could be pulled down to the umbilicus—but slipped back to the epigastric region on release. They were soft and cystic.

The pelvic tumour, felt through the abdominal wall, was slightly movable, and very large, nearly filling up the whole of the hypogastric and both iliac regions. It was tense, irregular and lobulated and no thrill was felt.

The patient's general condition was rather poor—but she was not anæmic.

The diagnosis seemed to lie between an ovarian sarcoma, with extensions or secondaries in the upper abdomen, a parovarian cyst, or a case of tuberculous salpingo-oophoritis.

On vaginal examination, a great deal of the vaginal wall was found prolapsed, owing to the great intrapelvic pressure of the tumour. The uterine body was completely merged into the tumour and only the tip of the cervix could be felt very high up behind the pubis. The tumour completely filled the whole pelvis and part of the vagina—so that no other information could be elicited by vaginal examination.

Considering the amount of mobility of the tumour, a laparotomy was undertaken under spinal anæsthesia, to ensure good relaxation.

The abdominal cysts were easily shelled out. The large one was in the transverse meso-colon and the smaller were attached to the under surface of the liver—but had a loose peritoneal attachment, which gave no difficulty in extraction.

The pelvic tumour, however, was much larger than anticipated and, owing to its position in the broad ligament and adhesion to the rectum, extremely difficult to take out. The uterine muscle was completely incorporated in the tumour and it was found impossible to save the uterus. The tubes and ovaries were free. The greatest difficulty in the extraction was in the lower part of the tumour, where it had encroached on the vagina to such an extent as to lie within about two inches of the vulval outlet. The sac was firmly adherent to the lower part of the rectum, so that the lowest portion had to be left *in situ*, to prevent injury to the rectum—but the rest of the tumour with the body of the uterus incorporated in it was taken out. The ovaries were left intact.

The cut end of the sac wall was sutured and an incision made from its lowest point into the vagina and a drainage tube put in.

There was a great deal of shock after the operation owing to so much peritoneal handling and pulling—but after a stormy convalescence, the patient is now almost recovered, three and a half weeks after operation.

The interesting point about the case is the rarity of hydatid cysts in the pelvis and the presence of the three quite separate tumours in the upper abdomen, which, the patient is convinced, existed there as long as she can remember. The contents of all the cysts were the same, so the question remains which are the primary and which the secondary tumours.*

A CASE OF MALARIA WITH ACUTE MANIA

By N. C. BHATTACHARJEE

Medical Officer, Kurigram Subdivision

On the 17th July last, a male, aged about 24 years, suddenly developed an attack of acute mania needing physical restraint. I was called in to see the man and found him with the following symptoms:—

The patient had to be controlled in bed by four attendants; he was talking foolishly but articulated distinctly; his eyes were shut and he resisted their being opened; Babinski's and Kernig's signs were negative. On enquiry I learnt that he had had a mild attack of fever a few months back, which may have been malaria, but he recovered without any medical help. On this account I thought it possible the present attack might be due to malignant malaria. The temperature was 99.4°F. and the pulse rate was 110 per minute, heart beat 'tictac', lungs normal, and spleen and liver were not palpable.

Blood films were taken for microscopic examination and quinine bilhydrochloride, grains xv, was given intramuscularly. A few doses of alkaline mixture with sedatives and a dose of calomel were given at night; cold application to the head was advised.

I was informed in the night at about 11 p.m. that the symptoms were not so violent as before, only the temperature rose to 101°F. I did not interfere further during the night.

18th July.—The patient was almost in his normal senses and the temperature came down to 99°F. He had two clear motions but his urine was very scanty, his eyes were still closed, he spoke rationally and complained of severe headache. The blood showed a few malignant tertian malaria parasites and there was a large mononuclear leucocytosis of 15 per cent. I gave him another injection of quinine and alkaline mixture with saline was given for the day. He was kept on fluid diet.

19th July.—The patient had improved considerably, he could open his eyes and his temperature was normal. Sinton's method of treatment for malaria was followed; he had no further rise of temperature and he recovered completely.

I am grateful to the Civil Surgeon, Rangpur, for allowing me to publish this note and to Dr. K. C. Banerjee for helping me in the examination of the blood.

* (Note.—According to the most recent work it is recognized that multiple hydatids in the peritoneum practically always arise as secondary to an hepatic or splenic cyst that has ruptured into the peritoneal cavity, liberating the scolices, some of which develop into cysts in every way identical with primary cysts.—*Editor, I. M. G.*)

Indian Medical Gazette

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MALARIA, ATEBRIN, AND MENTAL DISTURBANCES

MANY doctors who have had extensive experience with atabrin in the treatment of malaria and have used it in thousands of cases have never seen any instances of psychoses occurring in their patients as a result of its administration; on the other hand, ever since atabrin was first introduced instances of the occurrence of mental excitability and mental derangement have from time to time been encountered and reported. No special notice was taken of these isolated cases until Dr. Neave Kingsbury collected reports from practitioners in Malaya and published a series of seven cases in the *Lancet* at the end of 1934. He referred also to other cases that had occurred and had been reported at medical meetings in Malaya. In the majority of the cases the mental disturbance was of short duration and in other instances the patients had previous personal or family histories of psychosis. The first symptoms appeared at different periods in the course of treatment and in no instance had the patients received more than a seven-day course of 0.3 gramme daily by mouth, but apparently all were receiving the full oral dose of 0.1 gramme three daily; Dr. Neave Kingsbury suggested that it might be advisable to sacrifice efficiency to safety and give not more than 0.2 gramme daily. Atabrin has been very extensively used in Malaya, so that these cases he reports are collected from probably tens of thousands of cases in which the drug has been given by the oral route.

Atabrin dihydrochloride had been administered by the intravenous and intramuscular route, both experimentally and clinically, before the highly-soluble compound atabrin musonate was introduced, but no large series of cases had been published. The special circumstances that were brought about by the malaria epidemic in Ceylon, combined with the dramatic results that were obtained with one or two large doses of atabrin musonate administered parenterally—reported in our April issue by Doctors Blazé and Simeons—have led to the extensive adoption of a plan of treatment of malaria that should possibly have been reserved for special circumstances.

In a paper included in our present issue and to which we shall refer again, Dr. Udalgama states that in Ceylon 'the standard form of treatment with this preparation (atabrin musonate), for an adult suffering from malaria, is two intramuscular injections each equal to 0.3 gramme of atabrin [presumably this means 0.375 gramme of the musonate which is

equivalent to 0.3 gramme of the dihydrochloride] with an interval of 24 hours between injections'. When this 'standard form of treatment' was applied under epidemic conditions in a mixed, probably ill-nourished population, one of the immediate results appears to have been an increase in the number of cases of psychosis. Incidents have occurred where the behaviour of the patients has brought them within the scope of the Law, reports have appeared in the public press, these ill-effects have been attributed to atabrin per se, and a false impression has been created.

In the paper referred to above, Dr. Udalgama reports seven cases of mental disturbance that occurred in a series of 644 cases treated with the 'standard' course of atabrin musonate. In five instances the maximum dosage was given; in one a child, aged 8, two doses of 0.16 gramme (atabrin equivalent) were given and in the other a single dose of 0.2 gramme. The duration of the psychoses was from 17 hours to over two months; in the last instance the later symptoms were ill-defined and from the history it seems possible that there was some other factor in the aetiology. In another instance, it would appear that the symptoms were such that it is doubtful if they should have been classed as primarily mental; the patient was admitted to hospital in a collapsed semi-conscious state and eventually died 'from mere exhaustion', a state of affairs more likely to be due to malarin than atabrin. As there seems to be some doubt if this last case should have been included in the series, we can place the incidence of mental symptoms at about one in every hundred cases treated.

In another paper in the present number, three Ceylon practitioners have summarized their experience based on the treatment of 3,500 cases in which they used the parenteral as well as the oral route for the administration of atabrin. They advocate smaller doses by intramuscular injection, 0.15 gramme atabrin hydrochloride or the equivalent in the form of the musonate, for an adult; they give two such doses and then complete the course of treatment by oral administration. In their experience mental excitability is rare and when it occurs is easily controlled by sedatives; they place the incidence of this mild form of mental disturbance at one in two hundred cases.

Cerebral excitation and more serious forms of psychosis have always been recognized as possible complications of severe malarial infections, and it is probable that instances of these conditions have been wrongly attributed to the action of atabrin. However, the evidence that we now have before us does seem to indicate that there is some aetiological connection between these mental disturbances and the administration of atabrin in a malarial subject, though there is as yet no evidence to suggest that they are the result of the action of atabrin

per se on the tissues. We know little about the mode of action of atabrin on malarial infection, but, whether the action is a lethal one on the parasite itself or a stimulative one on the tissues, it is quite conceivable that a sudden liberation of malarial 'toxins' or of the results of katabolic processes, following a large effective dose of atabrin, might produce cerebral symptoms. On the other hand, it is possible that a large, though normally a sub-toxic dose, of atabrin might produce direct toxic effects in persons with a specific sensitivity or whose tissues have been damaged by the malarial infection.

Whatever is the mode of action of this drug the evidence does seem to suggest that the frequency of the occurrence of mental symptoms bears direct relationship to the size of the dose of atabrin administered; when oral administration only was used, they were very rare; with a moderate parenteral dose (0.15 gramme), they are still comparatively rare and always easily controlled; and with the larger doses (0.3 gramme), the psychoses may occur more frequently and tend to be more serious and more prolonged. This observation does not lend any support to either theory regarding the causation of these mental disturbances; if the action is direct, it would be natural that the larger the dose of the drug the greater is the number of persons that are likely to be affected, or, if it is indirect, again the greater the dose the greater will be the amount of malarial 'toxin', or products of katabolism, liberated.

In any discussion on the toxicity of a drug there are two things to be considered, the drug and the individual to which it is given. If the drug is a stable chemical compound, the drug factor is probably a constant one; the individual factor is, however, never constant. If you take a large number of white mice, all bred from the same strain under the same conditions and all approximately of the same weight, divide them up into batches of ten, and give increasing doses of a toxic drug to each batch, you will not get a hard and fast line between the lethal and the sub-lethal dose of the drug. There may be a very considerable disparity between the dose that all the mice survive and the dose that kills them all, and it is not uncommon to find that some mice will survive even 10 times the dose that killed others. If this occurs in a comparatively homogeneous population, one must expect a greater range of susceptibility in man, in whom there are variations, not only in age—for this, allowance is usually made—but, in race, in weight, and in general state of health.

When a drug is first introduced into therapeutics the dosage that is used is necessarily arbitrary. Admittedly, it will have been based first on animal experiments and then on a few controlled experiments on man. A dosage that is considered to be well within safe limits is always chosen, but the individual factor is such

an uncertain one that subsequent experience may show that, though this dose produces no symptoms in the first 100 cases in which it is used, in the 101st case it will produce alarming symptoms, and the original dosage may have to be modified. This actually happened in the case of plasmochin; the original dosage suggested was undoubtedly too high, and safer doses are now recommended by the introducers of this useful drug. The dosage is, of course, also governed by the therapeutic considerations, as it would be absurd to give a drug, however harmless, in doses above the maximum effective dose, but even this can only be ascertained by extensive clinical trial.

It seems to us that in the case of atabrin the dosage first suggested was in all probability the optimum one. A five-day course of thrice-daily doses of 0.1 gramme seems to be a therapeutically effective one, to be a course not so prolonged that in ordinary circumstances the patient loses interest and fails to co-operate, and to be a dosage with a very considerable margin of safety, though, as we have seen, rarely untoward symptoms do occur. Future experience may show that a twice-daily dose extended over a period of seven days is almost equally efficacious, though the data we have at present do not indicate this.

On the other hand, experience does seem to have indicated that if the dosage is increased above this optimum the chance of untoward symptoms occurring is also increased. Circumstances may demand that this extra risk should be taken; for example, in severe types of malignant malaria, parenteral injections may be indicated, and in Ceylon, where mass treatment was carried out in villages, the large intramuscular injections were obviously justifiable on the grounds of administrative expediency.

To return from the general to the particular, we must face the fact that with the ordinary dosage of atabrin instances of temporary mental excitation will very rarely occur, and that if we increase the dose, as in certain circumstances it may be perfectly justifiable to do, we are increasing the chances of the occurrence of these mental symptoms and we must warn our patients accordingly.

PAUL EHRLICH AND THE SALVARSAN SILVER JUBILEE

THE treatment of syphilis by the organic arsenical compounds is such an established part of everyday practice that it is hard for the practitioner of the present generation to realize that only a quarter of a century ago the first reports of Paul Ehrlich's great discovery were being received with a combination of scepticism and enthusiasm by the essentially conservative medical profession. Both the enthusiasts and the sceptics will remember what they said—or some of what they said—and will no doubt consider that time has justified their optimism

—or pessimism, as the case may be. Admittedly, the *therapia magna sterilisans* that was expected to follow immediately on the heels of '606' has not matured, but few, even of the most enthusiastic, can have foreseen that in so short a time this new science of experimental chemotherapy, of which the preparation of salvarsan was the first striking success, would place within the reach of the physician so many new missiles to use in his fight against disease.

The physician in the tropics in particular owes much to chemotherapy as it has given him, as well as salvarsan itself which he uses in syphilis, yaws, relapsing fever and rat-bite fever, a number of specifics for conditions that were considered incurable only a few years ago, Bayer 205 and tryparsamide for the treatment of trypanosomiasis, stibanyl, urea stibamine and neostibosan for leishmaniasis, and antimosan and foudadin for schistosomiasis, and many other powerful drugs, such as carbarsone, atelrin, and plasmochin.

Paul Ehrlich, born in Silesia in Germany where the art of dyeing flourishes as an old



P Ehrlich

handicraft, was familiar from his boyhood with dyestuffs and the very knowledge that in technical processes certain dyes were fixed by certain fibres gave a strong impulse to his research work in later years, so that it was not a matter of pure chance that he took up this line of research.

As a research worker he combined accuracy and power of deduction with a plastic and vivid sense of imagination. When attending the microscopical courses as a young student in Strasburg, his one-time teacher Prof. Waldeyer found to his surprise Ehrlich's place in the laboratory covered by a patchwork of stains of many colours and asked the student what he was doing. The answer was: 'I am staining',

whereon his teacher could only reply 'Well go on by all means'.

Paul Ehrlich never abandoned his particular fondness for dyestuffs and their effect on dead and living tissues. He very soon became aware of the immense importance of this question for biochemical problems. His first work was a treatise on the differential staining of leucocytes. He proceeded further by studying the oxidation and reduction in the organism and the action of dyestuffs on trypanosomes and finally on spirochetes. Thus, he became the founder of modern chemotherapy proper which aims at destroying the parasites only without affecting the host organism. If one takes the trouble to go through his lecture on chemotherapeutic investigations delivered at the session of the German Dermatological Association (Frankfurt, 1908), it is a matter of surprise that the striking success of his trials with animals did not make a far greater impression on the medical profession than was actually the case. But even Ehrlich himself, influenced by his friend Neisser, was convinced of the curative effect of mercury as a specific in syphilis to such an extent that he only reluctantly entered a new path in the fight against this disease.

Ehrlich's work received a fresh impulse when Paul Uhlenhuth in 1907 demonstrated the striking effect of the arsenic preparation atoxyl in fowl spirochaetosis, an action which was confirmed in collaboration with E. Hoffmann in experimental syphilis in monkeys. Ehrlich found a willing helper in his chemical work in Berthelm and in his experimental work Hata took a considerable share, although all the time Ehrlich's mighty genius guided their work.

He tried 605 different compounds, each one of which failed to come up to the mark in some respect or other. At last the 606th preparation, chemically a dioxy-diamino-arsenobenzol-dihydrochloride, was synthesized and experiments on rabbits with this preparation gave such overwhelming results even with one injection that a trial in human beings suggested itself. Apparently a *therapia sterilisans magna* had been found which immediately destroyed *Spirochaeta pallida* without endangering the patient himself to an undue extent. Still, treatment with atoxyl and its potential dangers were yet fresh in the minds of the profession and it was not easy for Ehrlich to find anybody who would take the responsibility of carrying out clinical tests with this new powerful preparation. Professor Konrad Alt was the first to adopt Ehrlich's ideas and to introduce treatment with '606' in his clinics at Uchtspringe. Two of his assistants, Drs. Josef Hoppe and W. Wittneben whose names deserve to be told to posterity, tried the preparation on themselves and only when these injections were borne without serious by-effects were further trials carried out with 0.3 g. of salvarsan

reckoned with as a real menace in the life of the Assam ryot.

Kahn tests

Routine Kahn tests have given the following results :—

Number of sera tested	Number negative	Number positive
46	37	9

Epidemic diseases

In 1934, Assam was visited with a wide-spread epidemic of measles with an average mortality rate of 2.2 per cent mainly amongst children. Laboratory work here was directed to the preparation of 10-day convalescent serum which was administered to a large number of contacts with excellent results.

Serum was collected, tested by the Kahn method and for sterility, and released for use in the epidemic area. The results are recorded elsewhere (Manson, 1935). The total number of contacts treated with this convalescent serum was 285, of whom only 3 contracted measles subsequently.

Vaccines

Autogenous vaccines are now prepared for suitable cases and the following table shows the number and type of vaccines made from June 1934 to October 1935.

Number of autogenous vaccines prepared	Type of vaccine	Notes
12	<i>Staphylococcus aureus</i> , <i>citreus</i> and <i>albus</i> .	
4	<i>Streptococcus hæmolyticus</i> . <i>Staphylococcus aureus</i>	Mixed vaccine.
2	<i>Pneumococcus M. catarrhalis</i> <i>Staphylococcus aureus</i>	Mixed vaccine.
5	<i>B. coli communis</i>	
1	<i>B. pseudo-carolinus</i>	
1	<i>B. pseudo-asiaticus</i>	
25		

Stool examinations

In addition to the routine stool examinations for helminth infections, etc., laboratory facilities here have been added to enable stool cultures to be carried out at the source.

The following table shows the results of these examinations :—

Result of stool culture.—The number of stools examined between December 1934 and October 1935 were 187. Of these, 33 showed the presence of non-lactose fermenters and the distribution was as follows :—

Organism isolated	Number of each species	Percentages
<i>B. pseudo-carolinus</i> ..	5	15.16
<i>B. pseudo-asiaticus</i> ..	6	18.18
<i>B. lunavensis</i> ..	9	27.27
<i>B. para-asiaticus</i> ..	2	6.06
<i>S. paradysenteriae</i> ..	1	3.03
<i>Enterococcus</i> ..	6	18.18
<i>B. faecalis alkaligenes</i>	1	3.03
<i>B. enteritidis</i> (Gaertner)	1	3.03
<i>B. pyocyaneus</i> ..	1	3.03
<i>B. cloacæ</i> ..	1	3.03
TOTAL ..	33	3.03

The organisms found are of interest in that the *B. shiga* and *B. flexner* are not present. This cannot be taken as absolute as the number examined is too small to allow of definite conclusions regarding Assam infections in general.

The presence of *B. pseudo-carolinus* and *B. pseudo-asiaticus* and similar organisms is of considerable importance, as these, which are possibly phage-modified types, are predominant in this small series. A comparison with the table on page 40 of the Annual Report of the Calcutta School of Tropical Medicine is instructive, as it shows the same paucity of Shiga and Flexner infections.

Negative results in stool cultures made from old stools are extremely uncertain as rapid overgrowth of secondary organisms occurs and may entirely swamp the original infection. This point emphasizes the need of field laboratory work, not only here, but under all similar conditions.

Urine examinations

The number of urine samples sent for culture was 19. Of these 12 were negative and 7 showed the presence of *B. coli communis*.

Conclusions

In compiling these notes, I am fully aware that I am adding nothing to the general knowledge of laboratory findings. They are mainly recorded to show what lines of laboratory work may conveniently be undertaken in a small field

laboratory and to emphasize the assistance that can be given on the spot to clinical work in coolie hospitals.

No plethora of apparatus is required. Beyond decent microscopes for blood work and dissection, a suitable incubator (preferably electric), a centrifuge, the usual laboratory glassware, culture media, etc., little is required.

A certain amount of application on the part of the medical officer is necessary to overcome the *vis inertiae* which is so characteristic of Assam conditions.

The benefits to the community are immediate and striking both in the reduction of sick rates and in reduction of medical expenditure. I have mentioned only the salient features of field laboratory work here and have not enumerated this paper with records of subsidiary biochemical laboratory work which lies beyond the sphere of tea garden requirements.

If I have roused the interest of my medical confreres, I shall feel that this short paper has not been written in vain.

Acknowledgments

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DRUG ADULTERATION AND SPURIOUS DRUGS IN INDIA*

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Introduction.—That the market in India was being flooded with drugs and chemicals of defective strength and impure quality by unscrupulous traders and that potent remedies, such as sera and vaccines, were being freely sold to the public without their quality being tested, was pointed out in the Council of State as early as 1927 by the Hon'ble Sir Haroon Jaffar. He characterized the practice as a great menace to the public health and called for the prompt

institution of efficient safeguards to ensure the quality and authenticity of medicinal preparations offered for sale to the public. The discussion that followed showed an appalling state of affairs and the Council recommended to the Government of India to urge all Provincial Governments to take such steps as may be necessary to control this state of affairs. In the Legislative Assembly Col. Sir Henry Gidney stressed the fact that India was *par excellence* the dumping ground for every variety of quack medicine and adulterated drugs manufactured in all parts of the world and that her markets were glutted with useless and deleterious drugs sold by unqualified chemists, who were themselves a public danger. He pleaded strongly for the immediate introduction of effective legislation to eradicate the existing evil. The commercial community were also alive to the fact that a large number of chemists and druggists stocked drugs of inferior quality for sale and that this had adversely affected the pharmaceutical industry in the country. Public opinion expressed itself in no uncertain terms and medical and scientific journals took up the question. The *Indian Medical Gazette* described India as a land of quacks, quack traders and quack medicines. The leading newspapers, such as the *Statesman*, vigorously championed the need for legislative interference to protect the masses from the perils of the situation. In response to this volume of opinion, the Government of India appointed a small *ad hoc* committee to explore and define the scope of the problem with reference to actualities and to make recommendations. Of this committee I was appointed the chairman and I therefore had the opportunity of coming intimately in contact with the problem as it existed all over India. The committee started work in October 1930, toured all over India and received a large mass of varied and voluminous evidence, both written and oral. It heard a wide range of opinion on both the medical and the commercial sides of the problem. All aspects of the question were carefully and systematically considered. The committee found that the situation as described in the Council of State and the Legislative Assembly was not in the least bit exaggerated; in fact it was even worse and called for stringent measures to cope with it. It is nearly four years since the committee completed its labours and made its report. On account of financial stringency it has not been possible for any action to be taken and the position has not improved. It would in fact appear from various reports that have been published in the press from time to time in different provinces that things have gone from bad to worse. In Bombay spurious drugs with counterfeit labels having the names of well known firms have been seized recently (February 1935), and the Committee of the Bombay Chemists and Druggists Association has passed and forwarded to the Government a resolution

* Being a paper read before the Calcutta Rotary Club on 5th November.

of apprehension and great alarm on the ever-increasing menace of adulteration of drugs prevalent in the country and of the frauds committed on the general public by unscrupulous dealers and fakers, to the detriment of the health of the public. A similar resolution reached the Government of India from an important body in the United Provinces last August and there is no doubt that the situation all over the country is the same. I can say from personal knowledge of Calcutta, which is one of the biggest drug trading and manufacturing centres in India, that the state of affairs is chaotic in the extreme, and manufacturers of standard products are suffering heavy losses. I will now tell you briefly how different classes of drugs are effected.

The quality of drugs and chemicals on the market in India

Firstly, I will explain the extent to which the drugs and chemicals of the British Pharmacopœia which are of impure quality or of defective strength are imported, manufactured or sold in India. This is the central problem as this group of drugs is the largest in use. There is unfortunately no room for doubt that in regard to adulteration, deterioration or tampering with the quality and strength of drugs very little distinction could be made between imported and locally manufactured medicinal preparations. It is well known that firms abroad manufacture drugs specially for the Indian market and, in the absence of control on the quality of drugs manufactured for export, these countries are able to undersell the local manufacturer of drugs. The dumping of inferior quality of drugs has its repercussion on the quality of drugs manufactured in India in that the quality is deteriorated to keep pace with the competitive rates of the dumped goods. A class of manufacturers has thus arisen who make and sell inferior and sometimes absolutely inactive products. Having regard to the seriousness and far-reaching character of the problem, the Drugs Enquiry Committee collected a large number of samples at random from different provinces and I subjected them to a careful analysis in my own laboratory. It was definitely proved that not only was adulteration common, but many firms sell packages which are considerably under strength and underweight. A perusal of the report of the committee will show what a large number of preparations are involved. The medicinal preparations were found considerably below strength and instances were met where quinine was entirely omitted from quinine tablets.

This state of affairs is in no way altered since and there is no doubt whatever that many of the drugs on the Indian market at the present time are of impure quality and defective strength. I can say from personal knowledge

that the traffic in such drugs at the present time is extensive and indiscriminate and the statements which have recently appeared in the press are in no way undeserved and exaggerated.

The second large group of drugs are those which are not officially recognized by the British Pharmacopœia but are known and approved medicines and are largely used. The extent to which such drugs of impure quality and insufficient strength are indiscriminately manufactured, sold or imported is the same as that of the pharmacopœial drugs. The groups of biological products include sera, vaccines, preparations from animal glands, hormones, etc., besides these there are complicated organo-metallic compounds containing arsenic, antimony, etc. Those imported into the country are frequently made by reliable firms of manufacturers having established reputations. The climatic conditions and defective storage, however, may produce rapid deterioration in their potency and it is well known that many of the retail sellers have not proper arrangements for storage of these products. Some of the importers do not hesitate to descend to the vile practice of getting hold of time-expired biological products from the European markets, importing them into India, and selling them to the dealers at a very cheap rate.

As regards those manufactured in this country, very few of the firms in India have the personnel and equipment to produce these products and therefore many of the preparations are not up to standard. Unfortunately complicated compounds of arsenic and antimony can be manufactured in India by anyone who may choose to do so and these potent compounds are being actually put on the market without their toxicity and strength being properly tested. Their standardization is at present left entirely to private enterprise and to manufacturers, and each maker is free to adopt his own conception of adequate standardization; there is no check whatever by the State. In other countries the toxicity of each batch of such complicated and potent preparations has to be carefully tested before they are allowed to be sold to the public. No licence is granted to any firm until the licensing authority is satisfied that the personnel and equipment of the firm is qualitatively and quantitatively efficient for the purposes for which licence is sought. In addition to this licensing system, samples of finished products are tested by the laboratories under State control. While in other countries careful watch is kept over these potent compounds the Indian public is entirely unprotected. The position indeed is discreditable to the country and is a source of great danger to the public. I have recently tested some of these compounds whose toxicity is high and yet they are being sold to the public, one shudders to think with what consequences.

The third group of drugs we are concerned with are the patent and proprietary medicines. The Indian market is inundated with proprietary and secret medicines both imported and of Indian origin, and their sale is increasing by leaps and bounds. The public in India consume them voraciously on account of the ingenious propaganda, and clever and alluring advertisements of their supposed virtues. The credulity and gullibility of the masses, especially when 'certain cures' are assured in utterly hopeless cases, can well be imagined. Perusal of advertisements of 'cures' produces a great effect on the patients who have tried treatment by medical men without success. The promise of cure, the force of argument advanced to guarantee it and the certificates of persons said to have been cured (who often do not exist at all) which are all set out in the advertisements make a deep impression. There is no doubt that while there are useful preparations among these, there are also positively injurious and fraudulent combinations and, on account of the lack of any State control in this country, their number is quite large.

What are the results of drug adulteration?

The substitution of genuine medicinal products by rubbish has now reached a very serious stage and its results can be easily imagined. In the case of pharmacopoeial drugs the patients to whom these drugs are prescribed will naturally not benefit by them. In diseases such as pneumonia, diphtheria, etc., it may make all the difference to the life of the patient whether he is getting a drug of proper strength or an adulterated or useless preparation. In the case of complicated organo-metallic compounds if they are not properly prepared and tested and in a state of absolute purity, their use will be positively dangerous and fatalities may occur. In the case of biological products, incalculable harm may follow the use of products which are improperly prepared or stored. The injection of faked insulin in cases of diabetic coma may lead to the death of the patient. The Medical Research Council in England have described the absence of control over these products as 'a source of grave danger to the country'. The misery, breakdown in health and mortality that might follow the use of some of the patent, proprietary and secret medicines cannot possibly be overestimated. Much harm may result from the use of such medicines in negative as well as in positive ways. A patent medicine might be injurious and cause direct harm as some of the constituents may be positively dangerous in absence of control. Some medicines might have the effect of masking early symptoms of serious and grave diseases and, assuaging them for a short period, result in delaying scientific diagnosis and treatment. Much valuable time may thus be wasted and investigation delayed until it is too late to do anything. It is for this

reason that rigid control is exercised in many countries over extravagant claims made in advertisements and that the law prohibits statements which are untrue, deceptive or misleading.

The remedy

How can the present unsatisfactory position be remedied? The Drugs Enquiry Committee has gone very carefully into the whole question and worked out a scheme by which control can be exercised on the medicinal preparations. This scheme has been generally accepted as being sound and effective. The essential parts of the scheme are firstly legislation and secondly machinery to collect and test drugs.

So far as the existing legislation is concerned, there is no enactment in the Indian legislature which aims directly at the prevention of adulteration or which ensures conformity to proper standards of purity and strength. Certain sections in the Indian Penal Code, the Indian Merchandise Marks Act (1889) and the Sea Custom contain some provisions bearing on it, but in actual practice they are difficult of application. The result is that mere adulteration of drugs is not, by itself, prohibited in British India by enactment. Nor is the sale of a drug of insufficient strength or improper standard punishable except on the basis of 'misrepresentation' and 'fraud'. These expressions are vague and are of inconclusive import. The baneful results of adulteration or defective strength of drugs may be slow and gradual in making themselves evident. The non-existence of fixed standards or methods of analysis, the absence of any precise definition of adulteration, the want of skilled experts and of well-equipped laboratories, the difficulty of proof and the fact that intention or knowledge is the essence of these offences, as well as cheating, complicate the situation and render the provisions ineffective in actual practice. The Calcutta Municipal Act of 1923 and Bengal Municipal Act of 1932 deal with foods and drugs in a fairly comprehensive manner; the former defines the expressions 'adulterated' and 'misbranded' in relation to foods and drugs, but unfortunately there is no machinery to work these. Most of the other provinces have some sort of legislation. For proper control of drugs, however, there should be central legislation for the country as a whole, because that is the only way in which effectiveness and uniformity of control throughout India can be brought about. This part of the scheme does not need any monetary expenditure and could be proceeded with at once.

The machinery to test medicinal preparations consists of a well-equipped central laboratory with a competent staff of experts in various branches, as well as provincial laboratories working under the guidance of the central laboratory. The provision for control includes the appointment of inspectors, who will be

appointed by local governments to pick up specimens and send them to the provincial laboratories for testing. It will thus be seen that, in any scheme of control, the Central Government as well as the Provincial Governments must take part. This portion of the scheme is bound to cost money in the beginning though later on a good deal of revenue will be obtained. On account of financial stringency funds have not been forthcoming, with the result that we are now in the same position as regards the control of drugs as we ever were.

In all fairness to the Central and Provincial Governments it may be said that the problem in India is not so simple as it looks. The profession of pharmacy is still unorganized in India and the question of the purity of drugs and the profession of pharmacy are interdependent. The important part which the pharmacists play in relation to drugs needs no special emphasis. They are the custodians of drugs. They prepare, compound and sell them, and on their efficiency depends the purity of the drugs dealt with by them. To ensure efficiency in discharge of duties and to guarantee that the drugs and medicines compounded, prepared, dispensed or sold are of proper strength and quality, it is essential that the pharmacists should be properly trained and under control. An untrained person cannot appreciate the value of scrupulous accuracy and the importance of purity and strength of medicinal preparations. In most parts of India at present anybody can compound and sell medicines. My committee worked out a scheme for organization of the profession and for the proper training and registration of those who practise it as a part of drug control. This is the only thing which will make them realize their responsibility, and thus help towards the disappearance of adulterated and spurious drugs.

Another problem which complicates matters in this country is the practice of the Indian systems of medicine and the drugs used by them. A very large proportion of the population, particularly in the villages and small towns, resorts to the indigenous systems of treatment and there is no doubt that many of the crude drugs as well as the compounded medicines offered for sale to the public are adulterated and of poor quality. Many of the practitioners in these systems use potent and toxic substances over which control is absolutely essential. It has been urged that if any legislation is undertaken for ensuring the purity of drugs, it should not be confined to drugs used by a small section of the population, namely those resorting to the western system of treatment only, and one may be disposed to argue that legislation which aims at dealing with the drugs used by the western system only will be truncated and lack in completeness of perfection. In the absence of standards, however, these drugs cannot be treated on the same lines

as drugs and chemicals recognized by the British Pharmacopœia and other western preparations. The only possible way is to keep the drugs and preparations of the indigenous systems separate at present. Yet another difficulty is the existence of foreign territories and Indian States in close proximity to the provinces.

Such is the problem of adulteration of drugs and its control with which we are faced in this country. The problem is undoubtedly a difficult one, but a remedy must be found to rectify the present state of affairs. Although public health is essentially a provincial subject, foods and drugs have not attracted the attention of local legislators to the extent they deserve. Drugs have fared worse than foods in this respect. I have already emphasized that no system of control in which the Provincial Governments do not take their due share along with the Central Government will be workable. Both must do their bit. An editorial in the *Statesman* recently under the title of 'Keeping a nation fit' reviewed the report of the British Ministry of Health of which the control of drugs forms a very important part. It pointed out that expenditure on public health is a long-term investment and that purity of food and drugs is the first line of attack in the unceasing war against disease and epidemics. Those who have the control of the purse in this country should follow the lead given by Britain who has invested large sums of money on public health matters and is already receiving the dividend on the long-term investment. Indian statesmen will we hope view this problem with the same breadth of vision as statesmen in other civilized countries have done.

THE COMBINED SYSTEM OF SOIL, WATER AND VENTILATION PIPES

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THE standard English practice for the water-carriage system has always been the provision of pipes for household waste water separate from the soil pipes, the latter receiving the discharge from water-closets only, and the prolongation upwards of both the waste-water and soil pipes as ventilating pipes, the necessary anti-siphonage pipes being provided where there are more than one story. This practice has also been followed in India. Practice in other European countries, as well as in America, has however been for a single pipe which received simultaneously the discharges from all toilet and kitchen fittings. Efforts are now being made to popularize and legalize this system in Great Britain and it has been labelled as the 'one pipe' system.

The London County Council undertook comprehensive changes in their drainage and sewerage by-laws in 1933 and within two years they published draft by-laws introducing radical changes in the requirements and adopting the 'one pipe' system. These by-laws are now in force and it is proposed here to describe in brief the main features of this system, how it differs from the old system and the advantages that are derived from it.

The following are the essential features of the new system (figure 1), as contrasted with the corresponding requirements of the old system (figure 2).

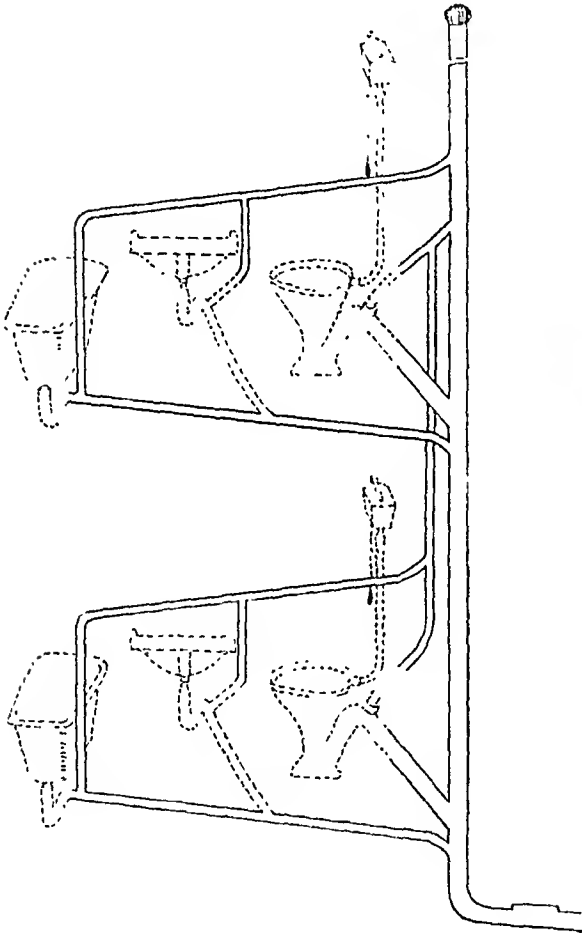


Fig. 1. New system.

1. All conveniences in a house—water-closets, baths, lavatory basins, kitchen sinks, etc.—are joined directly to the same pipe; formerly all fittings other than a water-closet were to be joined with a separate waste-water pipe and then through a gully trap to the soil pipe.

2. Formerly the water-closet had to be, either in a separate cubicle outside the house, or, if inside, it should adjoin an outside wall and the connecting pipe should pass out directly, the whole of the soil pipe being outside the building. Now the soil pipe need not be placed on an outside wall and may pass through inside a house, though a separate shaft open to the

sky for the soil pipe would be desirable. This permits the location of a water-closet practically anywhere in the house.

3. The ventilating pipe is also a single one beginning from the soil pipe below the lowest

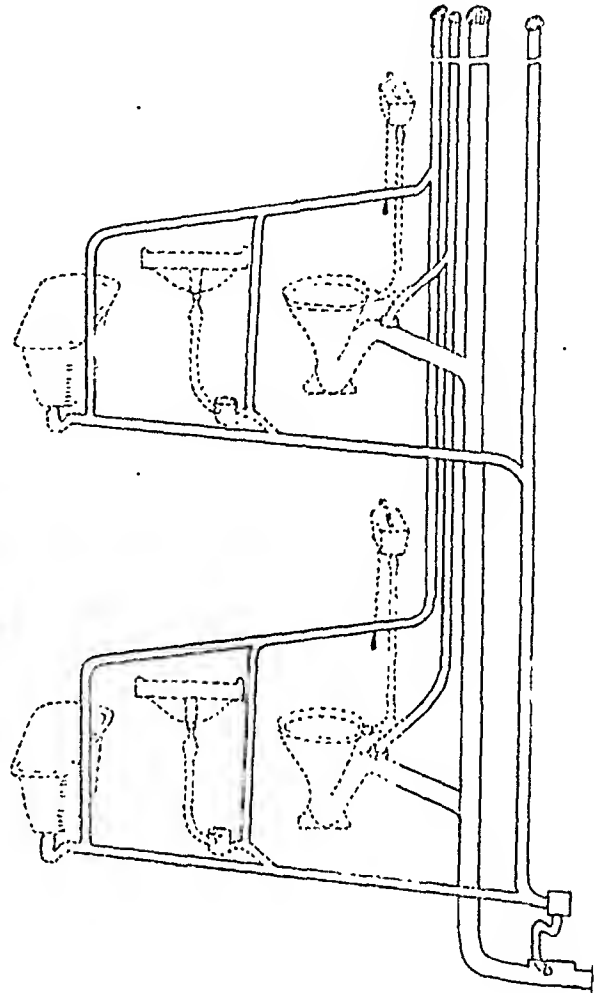
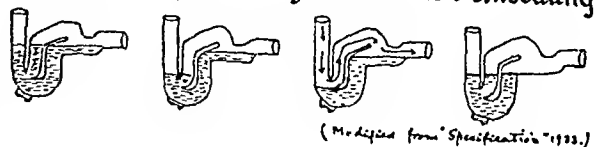


Fig. 2. Old system.

sanitary fitting and all anti-siphonage pipes are joined to it, whereas formerly the ventilating pipes for the soil pipes had to be separate from those for waste-water pipes.

4. Deep seals. $2\frac{1}{2}$ to 3 inches are to be provided and every one of them is to have an anti-siphonage pipe except when special seals that resist unsealing are installed (figure 3). Formerly all traps had to be ventilated, even

Anti-vac Trap showing how it resists Unsealing



(Modified from "Specification" 1933.)

Fig. 3.

though there were no risks of their being unsealed through siphonage action.

5. As all fittings are now to be connected directly to the soil pipes, gully pits are not required except where rain water or surface wash water is to enter the sewerage system. Formerly all sullage-water fittings were to discharge in the open air outside into a channel leading to a trapped gully pit at least 18 inches distant from the discharge openings.

6. An intercepting chamber, or in small installations a disconnecting and ventilating trap, was obligatory for all. This is now considered not only redundant but even pernicious.

7. The soil pipes are to be of cast iron, discharge pipes from toilet fittings are to be of copper so that the presence of hot water in them may not introduce complications through expansion.

The main advantage of the 'one pipe' system is the considerable reduction in cost of installation through the reduced number of pipes and ventilating shafts, the abolition of gully traps and of the intercepting chambers.

For Indian towns this is a considerable advantage as it would place the water-carriage system within reach of the small householder who though cognizant of its advantages has to deny himself its benefit through considerations of cost alone.

The external appearance of a building would be considerably improved through the pipes being located inside it, or even if they are placed outside, through their numbers being considerably decreased.

A gully trap, even when properly designed, catches a small quantity of the suspended matter which putrefies and, inasmuch as the water passing through gully traps (particularly under Indian conditions of a more concentrated sewage) may be charged with considerable amount of organic matter, much nuisance is produced through the interposition of several gully pits with traps. Abolition of such traps would lead to considerable abatement of the nuisance from this source.

On the other hand, no harmful effects have been noticed as arising from this system in any of the countries where it has been in use. The old recommendations date back to the pre-bacteriology era when sewer gases and effluvia from polluted soil and decomposing organic material were considered potent factors in determining the causation of zymotic diseases in general and typhoid fever and diphtheria in particular. Modern bacteriology has dispelled all that vague belief and replaced it by the definite knowledge that sewer gas is harmless in itself and may even be better than the atmosphere of some of the dirtier streets.

Thus, as the 'one pipe' system has been successfully used in so many countries and as it has been adopted in England, it is considered desirable that it should be introduced in Indian towns which have sewerage systems. This would enable the middle-class people to benefit more and more from sanitary facilities, thus brought within their reach.

It is very necessary that for Indian conditions a set of minimum standard requirements in sanitary engineering, including plumbing, be laid down similar to those laid down recently in Great Britain by the Institute of Plumbers, or some time back (1924) in the United States of America by a special sub-committee appointed by the Government Bureau of Standards. The report of the latter sub-committee not only gives the standards but also all the experimental data on which they have been based.

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Medical News

BOMBAY MEDICAL COUNCIL

THE following extracts from the summary of the proceedings of the meeting of the Bombay Medical Council held on 3rd September, 1935, are published for information:—

The Council proceeded to consider the application of the Rangoon University for the acceptance of the L.M. & S. of that university for registration under the Bombay Medical Act, 1912, and decided that Government be asked to add the L.M. & S. of the Rangoon University to paragraph 1 of the schedule to the Bombay Medical Act.

The Council proceeded to consider the application from the Director, Medical and Sanitation Department, H. E. H. the Nizam's Dominions, for the acceptance of the M.B., B.S. degree and the L.M. & S. diploma of the Osmania University, Hyderabad, Deccan, for

registration under the Bombay Medical Act, 1912, and resolved that the matter be referred back to the executive committee of the Council for further consideration in the light of the information since received from the Director, viz, that the medium of instruction at the Osmania Medical College, according to the regulations of the Osmania University, is Urdu.

The Council proceeded to consider certain papers received from Government relating to the question of recognition, for registration under the Bombay Medical Act, of the medical graduates of American "A"-class universities on certain conditions, which had previously been under discussion, and it was decided that, in view of the recent establishment of the Medical Council of India and the functions entrusted to it, it should be suggested to Government that the question be referred to that Council.

The Council considered the reports on the first L.C.P.S. examination received from the visitors appointed by the Council to attend and be present at the professional examinations for the L.C.P.S. and it was decided that the reports be referred to the College of Physicians and Surgeons of Bombay for the necessary further action.

The Council proceeded to consider an appeal from Mr. U. H. Sadarangani, M.A., B.S., of Karachi, regarding a resolution of the executive committee of the Council, laying down that the size of his signboards be reduced to the minimum and that, at the least, a 4-foot board be substituted for the existing 8-foot board, and it was decided to accept the resolution of the Committee.

The Council proceeded to consider the papers received from Government relating to the application of Mr. K. P. Deshpande for permission to be registered under section 7(2) of the Bombay Medical Act, 1912, and decided that, in the opinion of the Council, Mr. Deshpande may be given the permission applied for.

The Council proceeded to consider the question of the instructions to be issued to the visitors appointed by the Council to attend and be present at professional examinations and it was decided that, as the last visits of the visitors to the professional examinations for the L.C.P.S., Bombay, had only recently been completed, a further inspection of them this year is not necessary.

The Council resumed consideration of the application made by Mr. S. P. Lulla, M.A., B.S., for the restoration of his name to the Bombay Medical Register and resolved that his name be restored to the Register as a special case.

The Council proceeded to consider again the application of Mr. Motiram Tirithdas Ramchandani, M.A., B.S., for the restoration of his name to the Bombay Medical Register and resolved that some more time should elapse before Mr. Ramchandani's application is entertained.

The Council proceeded to consider the application of Mr. Narayan Krishna Paise, L.C.P.S., for the restoration of his name to the Bombay Medical Register and resolved that, in view of the short time that has elapsed since the removal of his name from the Register, his application for the restoration of his name to the Register should not be entertained yet.

The Council proceeded to consider the application of Mr. Ganpat Subrao Kasyapi, L.M. & S., for the restoration of his name to the Bombay Medical Register and resolved that, in view of the short time that has elapsed since the removal of his name from the Register, his application for the restoration of his name to the Register should not be entertained yet.

The Council considered a motion made by Mr. M. N. Talati, L.C.P.S., (1) that, in the absence of the benefits of a provident fund, the staff of the Bombay Medical Council be given a reasonable amount of bonus for the financial year 1934-35, and (2) that steps should be taken at a very early date to establish a provident fund for the benefit of the staff of the Council with effect from 1st April, 1935, and it was resolved that only the proposal to institute a provident fund for the staff be accepted and that the necessary further steps to work out the details be taken.

The Council proceeded to consider a motion made by Mr. R. A. Amesur for the creation of a separate cadre of teachers for the three government medical schools in the Presidency and for the proper equipment of the laboratories and museums provided for them and eventually it was decided to invite the attention of Government to the reports of the visitors appointed last year to visit the examinations for the L.C.P.S. and to the necessity for the introduction of a special teaching cadre and better equipped laboratories and museums for certain departments of the medical schools.

THE SETH GORDHANDAS SUNDERDAS MEDICAL COLLEGE MAGAZINE

We are pleased to accord a welcome to volume I, no. 1, of the *Seth Gordhandas Sunderdas Medical College Magazine*. It is very well produced and is printed on first class paper and it has an attractive cover on which are displayed the colours green, silver and purple, presumably the college colours.

The major portion of the ninety pages the number contains is devoted to short articles on medicine and surgery contributed by the student's teachers, but there are a few pages devoted to news and sport; these are placed near the middle of the book, between technical articles. We would suggest they might be better either at the end or the beginning.

On the whole it is a production of which the students of the college should be proud, and we congratulate them on their enterprise in commencing this magazine which cannot fail to be of social and educational value to them.

THE SOCIETY FOR THE STUDY AND PROMOTION OF FAMILY HYGIENE INCLUDING SEX HYGIENE

AIMS AND OBJECTS

The aim of the Society is, broadly, to help in increasing happiness in the marital and family relationships, and ensuring a general improvement of the human race. The family is here the central agent.

The institution of marriage is the basis of the family and sex is the most important factor contributing to harmony and happiness in marriage. While people have correct and even scientific knowledge of at least some aspects of family and marriage, their ideas about sex are often vague, misleading and even harmful. They are however becoming aware that there is a growing contrast between tradition and law regarding sexual life on the one hand and the real behaviour of men and women on the other. In consequence personal decisions on these matters have become increasingly difficult for the last two generations. Advice of every kind, psychological, medical, social, legal, and so on, is therefore more important to-day than ever before.

The value of all advice on sexual life depends wholly on scientific research. In view of the complicated aspects of sexology and its relations to other sciences, research cannot be of a medical nature alone but should be as wide and varied as possible.

The Society must therefore have its scientific aspect in the form of facilities for research as well as a practical one as an advisory centre on all problems coming within its scope. These can only be achieved by:

1. Granting scholarships and endowments for stimulating and organizing research on the subjects covered by the term, family hygiene.
2. Publishing reports, leaflets, etc., and also the quarterly *Marriage Hygiene* which will contain scientific contributions dealing with family, marriage and sex functions in their social and biological aspects.
3. Organizing propaganda for the introduction of sex education in all primary and secondary schools.
4. Starting and promoting family and marriage hygiene consultation centres and contraceptive clinics and co-ordinating the activities of those already existing.
5. Holding periodical conferences and arranging for lectures.
6. Supplying the best available advice to the members of the Society on their personal problems coming under the term family and marriage hygiene, such as, venereal diseases, legal difficulties, sex psychology, sex economics, etc.
7. Making available to members a library containing selected scientific books published on these subjects.

8. Collecting and collating manuscripts, press cuttings, photographs, etc.

9. Building up a museum for educational purposes.

10. Arranging to offer expert scientific advice in criminal sex cases.

The work is facilitated as the journal *Marriage Hygiene* has already international connections. The help and co-operation of experts have already been promised. In course of time, it is expected that the Society will either expand into an international organization or be affiliated to those working on similar lines in other countries.

Membership is open to adults of both sexes who are in sympathy with the objects of the Society. The subscription will be at the rate of Rs. 10 per annum; this will entitle the member to certain privileges and he will also receive the quarterly publication *Marriage Hygiene*. The present subscribers to this quarterly can join the Society by applying to the Secretary, and without further payment.

There are other classes of membership. Further details can be ascertained from the Secretary, who is also the Editor of *Marriage Hygiene*, Kodak House, Hornby Road, Bombay.

THE BOMBAY OBSTETRIC AND GYNÆCOLOGICAL SOCIETY

RESOLUTIONS adopted by the Bombay Obstetric and Gynæcological Society at its Meeting of the 27th August, 1935:

1. The Bombay Obstetric and Gynæcological Society believes that the recommendations made by the Medical Council of India in respect of the training of students in midwifery, gynæcology and infant hygiene are defective and inadequate, inasmuch as the prescribed period of three months for practical work in midwifery and gynæcology and fixing the minimum number of labour cases to be conducted by the student to five are not at all sufficient to give the student enough knowledge on the subject, as a general practitioner is expected to possess.

2. The society is of the opinion—

(a) That the period of practical instruction in midwifery and gynæcology should extend over a period of six months, instead of three as recommended by the Medical Council of India.

(b) That the minimum number of labour cases conducted personally by the student under adequate

supervision in a recognized maternity hospital should be fixed to twenty instead of five, as prescribed by the Medical Council of India.

(c) That it will not be practicable to conduct clinical examinations in gynæcology.

3. This meeting requests the honorary secretaries of the society that copies of the resolutions passed at this meeting should be sent to the following:—

(1) Medical Council of India.

(2) University of Bombay.

(3) The Bombay representatives on the Medical Council of India.

(4) Other Universities of India.

[Note.—We are in complete agreement with resolutions 1 and 2(a).]

With reference to resolution 2(b), we agree that the number should be 20 instead of 5, but there seems to be no necessity to lay it down so emphatically that the cases must be conducted in hospital. Despite the increasing tendency to institutionalization of midwifery cases, the major part of the confinements in India take place at home and will continue to occur there for many years. In the interests of the students, no less than for the improvement of domiciliary midwifery practice, we think practical experience of midwifery in the home would be a very valuable addition to the present training of the medical student. Facilities rarely exist at present for providing district experience under adequate supervision, and while it would seem preferable to make five cases in the district compulsory, the present situation could be best met by omitting the words 'in a recognized maternity hospital' from the resolution.

With reference to resolution 2(c), a final clinical examination in gynæcology was conducted in Scotland until quite recently and so far as we know is still a recognized part of the final examination. A clinical examination is certainly not impracticable in Great Britain and though difficult in India, it is not in our opinion impracticable. The estimate of the students' skill in gynæcological diagnosis need not necessarily be made during the course of the final examinations; the examination could be conducted at some prior date and a certificate of fitness given by internal and external examiners. We consider that some such practice is essential to ensure that reasonable facilities for acquiring experience are provided for the students and for rescuing gynæcology from the hands of half-trained nurses and *dais*.—EDITOR, *I. M. G.*

Current Topics

The Treatment of Acute Otitis Media

By F. H. DIGGLE, F.R.C.S.

(From the *Medical Press and Circular*, Vol. CXC.
26th June, 1935, p. 595)

ANY acute inflammation of the middle ear may be catarrhal or suppurative, and the latter may have a catarrhal stage, or be suppurative from the outset. The type of inflammation is determined by the nature and virulence of the invading organism, as well as by the patient's natural resistance. So far as the principles of treatment are concerned, the exact recognition of the type of inflammation is perhaps a matter of little importance. Suffice it to say that in the catarrhal stage the deafness is usually not so profound, the pyrexia not so high, and the congestion of the tympanic membrane more localized to the periphery and along the handle of the malleus. Both types can, therefore, from the point of view of treatment, be considered together.

Treatment

In the vast majority of instances the otitic inflammation is due to a spread of infection up the Eustachian

tube, following the common cold, influenza or one of the exanthemata. Quite commonly treatment directed to this common source of infection is neglected in a case which otherwise may be soundly treated. Treatment must, therefore, be directed to (1) the source of infection, (2) the otitic inflammation.

(1) *The source of infection*.—Hot steam inhalations, medicated with menthol, or, if a more antiseptic effect is desired, with menthol and iodine, should be given three or four times a day, according to the severity of the symptoms. A pint of hot water at a temperature of 140°F. is placed in a jug, and a few crystals of menthol or other medicant added. The patient is instructed to inhale alternately through the mouth and through the nose, and exhale through the nose and mouth respectively, with the head over the jug and a towel over the head. The following solution is particularly useful in the more severe pyogenic infection of the nasopharynx:

R. Mentholis	..	..	gr. v
Tincturis iodidi	}	..	.. āā oz. ½
Acetici etheris			

Nasal douches and vigorous nose-blowing should be avoided, since both are liable to disseminate further infection along the Eustachian tube. For the same reason self-inflation of the ears, or politization, for the relief of deafness should be strictly avoided during the acute stage of the infection. The nasal passages may be gently cleansed by blowing down first one unoccluded nostril and then the other, at frequent intervals. On no account should both nostrils be compressed with the fingers over a handkerchief, as is the common practice.

If the nasal secretion be particularly profuse, the skin of the anterior nares may be protected by smearing with a little pure vaseline and an absorbent strip of gauze and wool and laid across the nostrils and secured by tapes behind the ears.

Inhalations may be supplemented or, especially in the case of very young children, replaced by instillation through the anterior nares of a few drops of Collosol Argentum (Crookes), or 2 to 5 per cent protargol twice daily.

Treatment of the middle-ear inflammation involves (1) absolute surgical cleanliness, (2) the relief of pain, and (3) the provision of drainage.

(1) *Surgical cleanliness.*—I am confident that if more attention were paid to this detail in the treatment of an acute otitis media the results would be greatly improved. An acute otitis media is primarily due to the invasion by a single organism, whether this be the streptococcus, the pneumococcus or the influenza bacillus, and any secondary infection of the middle-ear exudate from the lack of cleanliness undoubtedly tends towards chronicity of discharge.

So soon as a patient complains of earache, the external canal should be inspected and cleansed of ceruminous and epithelial debris by gentle syringing, and the canal sterilized by either syringing gently with a mild antiseptic lotion, such as carbolic lotion (1 in 60) or by the instillation of a few drops daily of 2 per cent carbolic acid in glycerine. The auricle should be cleansed with ether and spirit, and a sterile gauze dressing applied. I venture to suggest that if the ear were thus prepared at the outset in those exanthematic liable to acute otitis media as a complication, the results would be improved.

(2) *Relief of pain.*—It is always a matter of uncertainty whether anodyne drugs applied to the outer surface of an intact drumhead can, or do, relieve pain due to the accumulation and tension of fluid in the middle-ear cavity. Certainly drops containing cocaine or opium or its derivatives have very little, if any, effect. In the early stages a few drops of 2 per cent carbolic acid in glycerine do certainly afford some relief, and the application of dry heat to the ear, as by a lightly-filled hot-water bottle or a hot bran bag, is comforting. The pain of a middle-ear inflammation is mainly due to tension from the pressure of an inflammatory exudate in a confined bony space. As, therefore, the fluid in the middle ear increases, so does the pain, particularly if the texture of the tympanic membrane is such as to resist bulging and early spontaneous perforation. Too much time, therefore, should not be wasted in attempting to relieve pain by means other than the provision of free drainage to the middle-ear exudate.

(3) *Drainage of the middle ear.*—The early and free drainage of the middle-ear exudate afforded by an incision of the membrane—a paracentesis tympani—ensures in almost every case prompt relief to pain and undoubtedly greatly assists towards complete resolution of the middle-ear inflammation, with perfect recovery of hearing. In some few cases, notably severe streptococcal and influenza infections, pain is not immediately relieved by a paracentesis, but such is the exception rather than the rule. Then, again, one is frequently asked the question: 'Will this operation prevent a mastoid?' Admittedly, many 'acute ears', in which the membrane is allowed to perforate spontaneously make a perfect recovery. The size, situation and

incidence in the course of the inflammation of such spontaneous perforations are determining factors. Usually the spontaneous perforation is either too small or ill-placed to give free and dependent drainage; or else, owing to the structural density of the membrane, it occurs too late, after days of unnecessary suffering, to prevent serious infection of the mastoid process. I think, therefore, one can say with confidence that a timely paracentesis tympani does in the vast majority of cases prevent a mastoiditis. In some few, however, the infection is so virulent from the outset that the mucosa lining the whole middle-ear cleft, including the mastoid antrum, is grossly involved, and in these, in spite of an early paracentesis, a residual mastoid abscess is not avoided. Such types seem to run in epidemics, in which evidences of a severe generalized sepsis are predominant, and yet even in such one should not withhold at least an early skilled paracentesis.

The severity of the earache, the degree of bulging and congestion of the tympanic membrane or the inadequacy of a spontaneous perforation should be our criteria for a paracentesis. Pain not relieved in twenty-four hours, particularly with a rising temperature, demands immediate incision.

Treatment of middle-ear discharge

In assessing the value of treatment by drops, etc., to an acutely discharging ear, one should not overlook the undoubted fact that recovery not infrequently occurs without any treatment. Much harm, I am convinced, can result from too zealous after-care especially in the early catarrhal stage. The repeated instillation of irritative or viscid solutions, constant mopping of the external canal, and especially syringing, not only tend to produce secondary infection unless done under strict aseptic conditions, but quite frequently induce an irritative swelling of the external canal, hindering drainage, whilst forceful syringing may even drive infection into the mastoid antrum.

Nature has given us in the external auditory canal a perfect drainage tube, which, in my opinion, should be treated with great respect. It is extremely doubtful whether a sufficient quantity of ear-drops to be of any value can percolate through an incision in the ear-drum into a middle ear already full of exudate during the acute profusely discharging stage. One would first need to aspirate the middle-ear contents before applying the drops. Indeed, this procedure is, I believe, practised by a few, but requires skilled attention, and is, in my opinion, unnecessary and may even be harmful. The principles underlying successful treatment are, in any view, free and dependent drainage under strict aseptic precautions. A sterile pad of gauze and wool should be applied over the auricle, which has been previously cleansed with spirit or ether, and the patient instructed to lie on the affected ear for as many hours in the day as possible. If necessary, the skin of the auricle can be protected by smearing with sterile paraffin, and the outer dressing changed as frequently as necessary. Many cases, particularly if catarrhal, make a perfect recovery under this treatment alone. Should, however, the discharge be especially purulent and viscid, a few drops of hydrogen peroxide (vols. 10) may be instilled and allowed to remain three to four minutes, and the canal can then be gently mopped with a pledget of sterile cotton-wool, say, two or three times a day, according to the amount of the discharge.

Spirit drops during the acute stage are contra-indicated, as they only tend to produce pain. By the tenth to fourteenth day, in an uncomplicated case, the discharge begins to diminish, becoming more mucoid; and the use then of a few warmed drops, such as the following:—

R	Acidj boric		
	Spiritus vini recti	1	.. gr. x
	Aquæ	1	.. āā oz. ½

instilled once daily and allowed to soak for ten minutes, greatly assists resolution, particularly if any granulations are seen to be present around the membrane,

Persistence of otorrhœa

In a large percentage of cases the otorrhœa in a case so treated gradually diminishes, and by the end of the second or third week the middle ear is dry. Complete recovery of hearing usually takes a further four to six weeks, and if by then some residual deafness remains, gentle politization or self-inflation of the middle ear is beneficial. In some few, however, the otorrhœa persists, or may even increase. The cause must be sought for in the nasopharynx, the nose, the tympanic membrane and the mastoid antrum. A pad of infected adenoids or an unsuspected nasal sinus infection may be responsible. It is often surprising how frequently an acute nasal sinusitis complicates an acute otorrhœa, the existence of which is overshadowed by the ear symptoms. Each requires its appropriate treatment, but it is at this stage that I would particularly advocate the removal of adenoids. At one time it was my practice to remove the adenoids when the paracentesis was performed, *i.e.*, during the acute phase. A few cases, however, in which the previously healthy ear became seriously infected and the nasopharyngeal infection aggravated, altered my technique, with, I consider, improved results. I now prefer to treat the nasopharyngeal infection conservatively on the lines already detailed, removing, if the otorrhœa persists, the adenoids in the third or fourth week, or even months later, if the otitic inflammation has followed a normal course.

Occasionally the incision in the drumhead tends to close before complete cessation of discharge, or it may be blocked by granulation tissue. A second paracentesis, or the application of chromic acid with the daily use of spirit drops (75 to 100 per cent) is indicated.

Lastly, the course of continued otorrhœa may be, and usually is, due to infection of the mastoid antrum. How can such an infection be recognized? To await the classical textbook description of mastoid infection, namely, mastoid pain, tenderness and swelling, with displacement of the auricle, is a mistake. Valuable time can thus be lost in securing early cessation of discharge. The longer suppuration is allowed to persist, the greater are the risks of some degree of permanent deafness or tinnitus due to post-suppurative cicatricial changes either with or without a permanent perforation.

Mastoid swelling merely denotes a spread of infection to the superficial periosteum—a periosteitis—and may or may not arise according to the anatomical structure of the mastoid process. Other more reliable signs are otoscopic, and perhaps require more specialized training. Such evidences are to be found in a sagging of the posterior meatal wall and adjacent portions of the tympanic membrane. A profuse purulent discharge filling the meatus and rapidly re-appearing as fast as the external canal is cleansed is, however, almost invariably indicative of antral infection.

Pain and tenderness over the mastoid are valuable signs, but need not necessarily be present. Early mastoid pain and tenderness, which are frequently present at the outset of the otitic inflammation before middle-ear drainage is established, should not be confused with gross infection of the mastoid. Such early symptoms usually subside with free middle-ear drainage.

Temperature as a sign of mastoiditis is misleading. Indeed, quite commonly one finds gross infection in the antrum with perhaps exposures of the dura mater and lateral venous sinus, and yet with no pyrexia and little or no pain.

Drainage of the mastoid antrum

As soon as infection of the mastoid antrum is recognized as the cause of the persistent otorrhœa it should be immediately drained by the simple conservative (Schwartz) operation. It is an operation to those accustomed to aural surgery practically devoid of risks, and one so successful in securing perfect recovery with preservation of hearing as not to be neglected. An unrecognized antral infection may, it is true, gradually

subside, but with the risk of a permanent discharge, some degree of deafness and tinnitus, and all the risks contingent upon a chronic suppurative otitis media.

Space will not permit me to debate the controversial question as to whether mastoid drainage should be established early or late in the course of the infection. Surely there is only one time for drainage, namely, the correct time, which only experience can decide. To precipitate surgery in very virulent infections is wrought with great danger, and yet delay may be disastrous.

Malaria and Its Treatment

(From the *British Medical Journal*, 21st September, 1935, p. 552)

THE pressing need for an institute in Great Britain in which research on the chemistry of drugs for treating malaria and other diseases could be carried out was referred to at the meeting of the Chemistry Section of the British Association on Monday, 9th September. Colonel S. P. James, who opened the discussion, gave some interesting figures of the amount and cost of antimalarial drugs actually used, and of the morbidity of the disease. The Government had had to foot a bill of £350,000 for treatment and preventive measures in the Ceylon malaria outbreak, 14½ tons of quinine costing them £50,000 and £20,000 being paid for the German drug atehrin. Even the small island of Mauritius had spent the sum of 35,00,000 rupees since 1909 in fighting malaria, and Lagos had spent more. During the great war 70,000 British soldiers were ultimately put out of action in the Salonika campaign, while both the French and the Germans suffered equally badly. It was estimated that at the present time three and a half million persons die of malaria every year, most of the deaths occurring in parts of the British Empire. Though we disbursed nearly £500,000 on the purchase of quinine, yet our expenditure for research into the solution of the malaria problem amounted to barely a two-hundredth part of this sum. It was necessary to discover new drugs to supplement quinine treatment and to improve on it. The two important new antimalarial drugs—plasmoquine and atehrin—discovered by German chemists during the last eleven years were, added Colonel James, in some ways superior to quinine, but for benign tertiary malaria the latter was more effective. In spite of the humanitarian, economic, and imperial importance of antimalarial drugs there was, in this country, backwardness in research into their chemistry. In an account of investigations which had taken place under his direction, Professor R. Robinson stated that although twenty-four synthetic drugs had been discovered, none of them had the required effectiveness, and research had now reached a stage where further advance was impossible without adequate funds and more laboratories. Chemists needed a certain psychological stimulus, while chemical and biological co-operation could be made satisfactorily only when conducted under one roof; that was why a national institute for research in chemical therapy should now be founded. One contributor to the discussion was Professor Schulemann of Elberfeld, who attributed German successes in the production of plasmoquine and atehrin to the invention of new methods of testing the properties of synthetic substances by biologists. Plasmoquine was the thirty-fifth substance in a certain series, and since 1924 only one other effective substance had been found. The mode of operation of the two synthetic drugs was obscure, but some interesting facts were illustrated by experiments on mice. It was found that a joint application of the two drugs might produce abdominal pains, whereas if one were given immediately after the other there was no such effect. Mice could be killed if given the drugs on an empty stomach, but after a meal this did not occur. Yet if some of the gastric juice from these mice was injected into others which had had

nothing to eat they would die. This showed how drugs might be absorbed on the surface of food particles.

Therapy of Psoriasis

By THEODORE CORNBLEET

(From the *Journal of the American Medical Association*, Vol. CV, 13th July, 1935, p. 115)

THERE is no disorder more capricious in its responses to therapeutic measures than is psoriasis. Remedies that at one time are effective are valueless at another in the same person. The mildest agents may be helpful at first, and then the most powerful may not suffice to make an impression on the condition when it has reached an intractable state. There are no specifics and no known causes to attack. Out of the almost countless number of remedies proposed, only a few are worthy of mention as being relatively dependable.

One of the characteristics of psoriasis is the recurrence of the eruption at intervals. The periods of freedom may range from only a few weeks to many years. The aim of the treatment is then to clear up the eruption that is present. No promise for the future can be safely made. The treatment must be carried out in a thorough fashion until every trace of the lesions is removed. Any remaining lesions predispose to an early recurrence. As with many other dermatoses, the attack on psoriasis is by both general and local measures.

GENERAL MEASURES

The patient is given a thorough physical examination, and anything abnormal is corrected. The treatment for the skin condition itself proceeds as follows:

1. *Diet*.—A low protein diet has been advocated by many, who believe that it is helpful to reduce or entirely

Low fat diet

Forbidden:

All greasy soups.
All sausages and delicatessen, except frankfurters made of lean meat.
All fat meats, such as pork, mutton, fattened chicken, duck, goose, eel, herring, salmon, carp and other "rich" fish, roe and egg yolk.
All cheeses, except cottage (cream) cheese.
All fats (bacon, butter fat, palm, margarine, oil, cream, butter, whole milk, butter-milk and the like).
Meat may be roasted with some butter but the fat must be removed from the gravy by letting it get cold.
Cakes, cookies, whipped cream, butter cookies.

Allowed:

Lean soups (fat removed after letting it get cold); white of egg.
Lean beef (roast beef, boiled beef and so on).
Lean veal, lean venison (rabbit, deer and the like), lean ham.
Lean fowl (squab, chicken, partridge).
Lean fish (pike, cod, pickerel and others).
Sugar, malt, honey, raspberry juice and other fruit and berry juices.
All kinds of fruit and berries, raw or preserved.
Flour, rice, cream of wheat, potatoes, macaroni, noodles.
All kinds of vegetables, prepared without butter or fat.
Bread, white or rye bread, zwieback, toast, rolls.
Skim milk.

eliminate animal foods, including in this meat, eggs, poultry and fish, and in addition to forbid the use of peas and beans and fermented cheese. Recently a low fat diet has been advocated as more rational, because it is believed that in the psoriatic patient a disturbance of fat metabolism exists. Fat should be restricted to 20 gm. a day (10 gm. for children) including the fat used for cooking, and such diet must be continued for many months, as the effect does not appear for weeks or months and a relatively low fat diet must be continued indefinitely, as the psoriatic predisposition persists. The weight must be watched.

2. *Climate*.—Psoriasis is generally worse, or recurs only, during the winter season and usually improves with the appearance of warm weather. Many patients improve when they go to a warm, equable climate, and they may thus at times prevent the recurrences that they otherwise get with the advent of cold weather. Psoriasis does, however, occur in warm climates; but it is less prevalent in these. A resident in a warm climate

may derive benefit from a temporary change in residence even if it be to a colder one. A change in environment often is helpful even if only temporarily. A sea voyage or a trip to the seashore is said to be particularly helpful.

3. *Drugs*.—(a) Arsenic is, of all the internal remedies advocated, the most important. It sometimes will clear an eruption without the aid of local applications. It should never be used with an acute or progressive eruption. It should be used only when the eruption has become subacute or chronic or is stationary. As arsenic may lead to unfavorable changes when long continued, it should be used only at intervals. It is well to start with a small dose and to increase the dosage up to tolerance. When symptoms such as puffiness of the eyelids, edema of the ankles or gastro-intestinal disturbances are seen the dosage should be slightly reduced. There are some who believe it should be used only as a last resort, because it may lead to such untoward results as keratoses and epitheliomas, as well as to other damage. Solution of potassium arsenite (Fowler's solution) is the form of arsenical mostly used. Commencing with a dosage of three drops in water twice a day, this is increased by one drop each succeeding day until a maximum of from 10 to 15 drops is taken or until symptoms of intolerance appear. After a three months' use it is well to give the patient a rest from arsenic. It may be recommenced after a two to three months' interval. One should always write 'do not repeat' on the prescription, for many cases of chronic arsenic poisoning result from unsupervised continuance of the drug.

(b) Salicylate is held in high favour, particularly in early acute cases with considerable itching, in which arsenic is contra-indicated as it makes the itching worse. Sodium salicylate is generally used. It is prescribed in doses of 0.6 gm. with an equal amount of sodium bicarbonate to be taken freely diluted three times daily (prescription 1).

(c) Alkalis are used by many and are particularly favoured in gouty or rheumatic subjects. They may be combined with salicylate (prescription 1).

PRESCRIPTION 1.—Salicylate and Alkali

R	Sodium salicylate ..	..	10.00 gm.
	Sodium bicarbonate ..	..	10.00 gm.
	Cinnamon water ..	..	60.00 c.c.
	Syrup of cinnamon (N. F., VI) to make		120.00 c.c.

M. Label: Two teaspoonfuls in water three times daily after meals (in acute itching stage).

(d) Of other alternatives, antimony is sometimes of service in acute progressive cases. Other agents that have been recommended are colchicum, potassium iodide and mercurous iodide. Arsphenamine has been advocated by some but, except when there is a coexisting syphilis, it is questionable whether its use is justified. Thyroid and pituitary are said to be of value. As will be seen, there are many possible remedies but there is no reliable one.

4. *'Proteotherapy'*.—(a) Autohemotherapy: This method has gone through alternating periods of great favour and disfavour in psoriasis. Some feel that by itself it will clear many of the eruptions. There can be no question that at times it is of distinct benefit and that it often increases the effectiveness of other remedies. Twenty c.c. of whole blood is removed from the vein and injected intramuscularly, before clotting, generally into the gluteal region, every fifth day.

(b) Autoserotherapy: Blood, 50 c.c., may be removed, allowed to clot and centrifugated under sterile conditions. The serum is then injected intramuscularly or intravenously.

LOCAL THERAPY

General measures alone usually do not suffice to clear up an eruption. They require the aid of local applications.

1. *Removal of scales*.—The removal of scales that have accumulated on the lesions and offer an inert barrier to the effective action of the medicaments must

precede all local treatment. It may be accomplished by daily warm baths with liniment of soft soap ('tincture of green soap') and water. An alkaline bath, made by dissolving one or two teacupfuls of sodium bicarbonate in the bath, assists in the process. Following the bath the softened scales are brushed off with a Turkish towel. A stiff brush may be required to complete the removal of the scales. The skin may become dry as a result of this process and some bland grease or oil may be rubbed into the skin, which also helps to soften and remove the scales. Salicylic acid 5 to 10 per cent in petrolatum (prescription 2) applied to the lesions is particularly helpful toward removing obstinately adhering scales.

PRESCRIPTION 2.—Salicylic acid ointment

R	Salicylic acid	..	..	3.00 gm.
	Petrolatum	..	..	30.00 gm.

M. Label: Apply locally overnight (to aid in removal of scales).

2. *Soothing applications.*—Care must be used in the acute types or in the generalized forms not to use too stimulating an agent lest the skin be irritated and the eruption converted into an exfoliative dermatitis. In psoriasis, salves act better than lotions. In the acute forms a soothing ointment, such as ointment of rose water ('cold cream') or boric acid ointment, is likely to be found useful. As the eruption becomes less acute, more and more stimulating medicaments may be added; but the action of such applications should be closely watched and they should be promptly discontinued and bland ones substituted with the first signs of extension of the eruption or irritation of the surrounding skin.

3. *Irritative applications.*—These for the most part are reducing agents. The preferred ones are powerful.

(a) *Chrysarobin* is one of the most effective. Chrysarobin itself should not be used on the hands, face or scalp because it colours the normal skin deep brown and the hair yellow and it produces conjunctivitis. It may be used in ointments with petrolatum as the base in strengths of 1 to 10 per cent. After the application has been made to the lesions, it is sprinkled with talcum. After several days (from one to ten days, with an average of five days) the surrounding skin is seen to have become reddened. The chrysarobin ointment is then discontinued and a bland one used instead such as zinc ointment or boric acid ointment. As chrysarobin is irritating not only to the skin but also to the kidneys, patients having extensive application of this agent must be closely supervised. Discutient (scale removing) and irritative treatment may be combined as in a compound chrysarobin and salicylic acid ointment (Unna and Dreuw) useful for local scaly patches (prescription 3). From one to three days following the application of this ointment a brownish crust forms on the surrounding skin and the patches of psoriasis scale intensely. Bland ointment may then be used together with baths to remove the crusts and scales. After a few days the chrysarobin preparation may again be used, to be followed as before by simple oils or greases. Several such alternations are usually effective.

PRESCRIPTION 3.—Compound Chrysarobin and Salicylic Acid Ointment

R	Salicylic acid	..	..	10.00 gm.
	Chrysarobin	..	..	20.00 c.c.
	Oil of cade	..	..	25.00 gm.
	Soft Soap	..	..	30.00 gm.
	Petrolatum	..	..	100.00 gm.

M. Label: Apply to patches. (Useful on subacute, scaly lesions).

Less efficient than the ointments of chrysarobin are the chrysarobin varnishes. These have the advantage, however, that they may be better confined to the lesions themselves and help to spare the clothing, which otherwise is discoloured a mahogany brown stain that requires chlorinated lime or benzene for removal. A 7 per cent solution of chrysarobin in chloroform may be painted over the lesions. When the chloroform evaporates, a

fine powder remains, which is then covered over with flexible collodion. Simpler but less effective is a 7 per cent solution of chrysarobin in 'traumatizin', which is a 10 per cent solution of gutta percha in chloroform to which 2 per cent of salicylic acid may be added. When the films begin to peel, they are removed and replaced with a new application.

(b) *Tars* of various types, such as wood tar, oil of cade or coal tar, are preferred by some physicians, who no longer use chrysarobin because of its obvious disadvantages and because it may vary in its effectiveness from sample to sample. The tars may be used in 5 to 10 per cent strengths in zinc ointment or paste of zinc oxide (Lassar's Paste). They may be put in flexible collodion in somewhat greater strengths, from 10 to 20 per cent. Tar may be used with other agents such as sulphur or soft soap, as in the long used compound sulphur ointment (Wilkinson's ointment).

They may be used in liquid form and undiluted but are usually best dissolved in alcohol in 10 to 25 per cent strengths and salicylic acid 5 to 10 per cent, and soft soap 25 to 50 per cent may be added (prescription 4). The liquid form may be painted over the patch after removal of the scales following a bath. When the liquid tar preparation has dried for a while,

PRESCRIPTION 4.—Salicylated Oil of Cade Pigment

R	Salicylic acid	..	..	10.00 gm.
	Oil of cade	..	..	25.00 c.c.
	Soft Soap	..	..	25.00 gm.
	Alcohol	..	..	100.00 c.c.

M. Label: Paint over patches, permit to dry, and wash off excess in bath.

the patient may be returned to the bath and the excess of tar finally washed off. It is always well to begin the use of tar preparations with the weaker concentrations and build up to the stronger, because they may at times surprise one with an unexpected reaction; for the tars may produce toxic symptoms, such as vomiting and diarrhoea, and kidney irritation. These promptly disappear when the application is removed. Betanaphthol and resorcinol may be looked on as colourless tar succedanea, to be employed in 5 or 10 per cent solutions or ointment when the coloured tar preparations are objectionable.

(c) *Ammoniated mercury* is mostly used for the scalp. The strength is 10 per cent, and a base is used that will wash out of the scalp readily, such as rose water ointment. Salicylic acid may be incorporated to advantage in proportions of 3 to 5 per cent. Such an ointment (prescription 5) may also be used on the glabrous skin. The urine should be watched for signs of kidney irritation.

PRESCRIPTION 5.—Ammoniated Mercury and Salicylic Acid Ointment

R	Ammoniated mercury	..	..	3.00 gm.
	Salicylic acid	..	..	5.00 gm.
	Rose water ointment	..	..	30.00 gm.

M. Label: Apply to scalp.

4. *Irradiation.*—(a) Ultra-violet rays are most useful in the acute types of psoriasis as well as in the superficial types in folds. Some believe that their use at intervals, after involution of an eruption by other measures such as x-rays, may materially prevent recurrences. The exposures should be given twice weekly and to the point of obtaining definite reactions with pigmentations. This method is not quite so effective as that with the x-rays but is free from possibility of dangerous sequelae. A method that has been particularly effective is the combined use of 1 to 5 per cent coal tar ointment with ultra-violet rays. The ointment is spread on the skin about one-eighth inch thick. At daily intervals the excess ointment is wiped off with olive oil, a thin film of the crude coal tar being left. Irradiation with a mercury quartz lamp is then carried out. This is said to be particularly effective in the exfoliative dermatitis following psoriasis. This form of treatment should be carried out only in a hospital or where the patient can be closely supervised; but in modified form it can be used for ambulatory patients.

(b) When judiciously used, roentgen therapy is effective, painless and clean and requires no care on the part of the patient. Once he learns of it, he is apt to want it in preference to all other remedies. Its excessive use, however, is dangerous. Psoriasis is usually a recurrent disease and the repeated use of x-rays over an area is liable to lead to serious sequelae such as telangiectasis, keratosis and epitheliomatous degeneration. If from four to six weekly doses of a quarter unit (75 roentgens) are ineffective, it is wisest to discontinue the x-rays, as the eruption is apt to be resistant to further exposures. On the scalp it is perhaps best to employ weaker doses of about one-eighth unit (38 roentgens) once weekly. For the nails a quarter unit of filtered rays to the tip of the finger as far proximally as a half inch from the cuticle is most effective. Strong local remedies should not be used in conjunction with the x-rays. A 5 per cent ammoniated mercury ointment may generally be used with safety. Some believe that the psoriatic skin is more sensitive to x-rays than the normal. As with other dermatoses, dosage should be reduced for patches occupying the more tender skin in the folds, such as submammary and axillary. Psoriasis of the auditory canals may be treated with 0.5 unit filtered rays at intervals of two to three weeks. The surrounding skin should be carefully shielded. At times, lesions of psoriasis may involute promptly and recurrences be resistant, while x-rays are ineffective in some from the start. If roentgen treatment is persisted in without effect, the lesions are apt to become resistant to other measures as well, and increasing the dosage to obtain results leads to dangerous sequelae. X-rays should not be employed in eruptions that recur quickly or that are acute and spreading.

(c) Radium is of limited use in psoriasis. It is valuable in tube form in such places as the auditory canal. A silver tube screened with rubber and placed within the canal to give from 40 to 50 millicurie hours generally produces excellent results.

(d) W-rays or Grenz rays may be useful for hairy parts or where the underlying tissues may be injured by x-rays, such as the testes. The dosage should be such as not to provoke sharp reactions.

Surgical Shock

(From the *British Medical Journal*, 6th April, 1935, p. 706)

THE outstanding feature of primary shock is a fall in arterial pressure, but if the fall is such that the blood pressure remains at or above 80 mm. Hg. the oxygen requirements of the tissues may still be satisfactorily met. If, however, the blood pressure falls to about 70 mm. Hg., and is maintained at this level for some time, secondary shock supervenes, and the consequences are extremely serious. It is clear that there will be a diminution in oxygen supply to the tissues, with consequent fall in metabolic rate; the skin is cold and clammy, the pulse is thready, and the heart beats rapidly; respiration is shallow and poor; the patient is weak and toneless; thirst is experienced, but the patient may be unable to retain fluid in the stomach; finally, unless adequate measures are taken, the outcome is fatal. From the point of view of aetiology one need only consider primary shock, since the phenomena of secondary shock call for no special explanation, as they are the normal and anticipated consequences of a maintained extreme hypotension.

In a recent series of papers a valuable account has been given by a number of observers of modern views on primary shock. Professor W. B. Cannon presents a valuable review of the evidence for various theories. He rightly points out that a weakened heart is not a serious aetiological factor. The heart, even in such an emergency, is well able to make the additional effort required of it. Discussing the commonly enunciated view that shock is due to loss of vasomotor tone

(with consequent stagnation of large volumes of blood in the splanchnic region) Cannon draws attention to the fact that the fall in arterial blood pressure is responded to by a vaso-constriction through the carotid sinns. It is, of course, conceivable that a long-continued tissue anoxemia may lead to such malnutrition of nerve cells that a loss of vasomotor tone may occur, but it seems probable that by that time the situation is one of deep secondary shock. One of the main causes of shock seems to be in the reduction of blood volume, on which all observers are agreed. In some at present rather obscure way the blood volume is reduced below the minimum capacity of the vascular system, so that the vessel walls cannot contract down on the blood. The modes of production of this remarkable loss of blood fluids are the bases of several theories of causation. The theory that this is brought about by a toxic, histamine-like substance liberated from injured tissues is an old one, and dates from war-time observations. While there is still a considerable school of support for this view, the newer observations of several American workers have shown that the hypothetical toxic factor is not detectable (indeed, muscle tissue is remarkably poor in histamine) and that the blood lost from the circulation is really present in the injured tissue itself. The toxic theory cannot be dismissed merely on the grounds that muscle is poor in histamine, for there are certainly other powerful vaso-dilators in the muscles, and these might conceivably be concerned with the early stages of shock.

The probable involvement of the autonomic nervous system as an aetiological factor is suggested by a large number of facts—for example, pain and fear may bring on symptoms like mild shock; abdominal operations with manipulation of the viscera (hence stimulation of sympathetic afferents) may cause a fall of blood pressure to shock levels. Experiments by Freeman have demonstrated that stimulation of the sympatho-adrenal system may produce the shock syndrome, with fall in blood pressure and loss of consciousness. . . . must be remembered that . . . while causing splanchnic and cutaneous vaso-constriction, produces dilatation of the vessels of the muscles—a state of affairs that might readily allow of the passage of fluids into the muscles. Nevertheless, it is difficult to see how so complex a matter as filtration of blood plasma into muscles could explain the collapse which every medical man has seen in some cases on merely showing the patient a syringe with which blood is to be drawn. Psychogenic shock of this type seems surely to be related to some immediate and considerable diminution of the cerebral circulation; the consequent temporary collapse by serving to remove the psychological stimulus allows of correspondingly rapid recovery. How this type of shock is produced is unknown. Some experiments by Heuer and Andrus are of interest. These workers observed that aqueous extracts of fatally strangulated intestinal loops could, on intravenous injection into dogs, give rise to symptoms of shock, vaso-dilatation and loss of plasma from the blood. This effect would be antagonized by extracts of adrenal cortex, which is of great interest in view of the importance of the adrenal cortex in regulating the exchange of fluid between blood and tissues.

The special problem of traumatic shock following violent blows to a limb has recently been very carefully studied by O'Shaughnessy and Slome in the anesthetized cat. Using many modern methods of physiological research it was possible to demonstrate conclusively that 'a toxæmia due to the elaboration of histamine, or any other depressor substance in the traumatized area, plays no part in the syndrome of traumatic shock'. These authors make a strong case for local fluid loss and nervous stimuli in the aetiology of shock. Spinal anaesthesia before the injury delayed the onset of shock in spite of great fluid loss; also, spinal anaesthesia induced during the period of extreme circulatory failure led to marked recovery of blood pressure. This noteworthy paper, in conjunction with the findings of several American workers, accentuates

the immense importance of the elimination of nociceptive nervous stimuli in the prevention and treatment of traumatic shock.

The Indications and Results of Phrenic Nerve Operations

By H. M. DAVIES, M.D., M.Chir. (Camb.)
F.R.C.S. (Eng.)

(From the *Lancet*, 24th August, 1935, p. 418)

THERE are three operations for paralysing the dome of the diaphragm. There is *phrenic evulsion*. It is generally estimated that at least 10 cm. of the nerve must be torn out in order to be sure that the continuity of all accessory nerve bundles with the distal end of the phrenic nerve have been interrupted. Then there is *phrenicectomy*. This operation demands the section of a length of the main phrenic nerve and of all accessory nerves including the filaments to the sub-clavius muscle. The third operation is the *phrenic crush*. In this operation the main phrenic nerve is crushed and all accessory nerves are divided. The effect of the crush lasts from two to six months or even longer; regeneration may even fail to take place.

The immediate effect of these operations is paralysis of the hemidiaphragm; the muscle-fibres degenerate, and the dome becomes a sheet of fibrous tissue. It takes about four months for this process to become complete.

As a result of the paralysis there are three changes of the dome—namely, a rise into the thorax, a loss of tone, and a cessation of the normal respiratory movements. The dome either becomes immobile or shows paradoxical movements, sometimes with normal respiration but more often only with forceful efforts such as sniffing. Each of these changes has a separate or combined action on the thorax, the lung, and the disease.

Under normal conditions the rise of the diaphragm into the thorax during expiration is due to three factors: the relaxation of the muscle-fibres, the negative pressure in the pleural cavity, and the positive pressure in the abdomen. The descent during inspiration is, of course, due to contraction of the muscle-fibres. With the dome paralysed, it ascends into the thorax as a result of the difference between the negative intrapleural and the positive intra-abdominal pressures. When the lung is affected by chronic tuberculosis, although there is loss of elasticity of the lung, there are fibrous tissue changes which may more than counteract the loss of elasticity and, other things being equal, will increase the intrapleural negative pressure, and so exert an abnormal upward drag on the dome. *Per contra*, in a chronic invalid there may be loss of tone of the abdominal muscles and possibly visceroptosis, and the upward thrust on the under surface of the dome will be lessened.

There are other pathological states, however, which may interfere with the post-paralytic rise of the dome. Thickening of the pleural membranes, particularly of the diaphragmatic pleura, superimposes on the dome a tough layer of tissue which yields but grudgingly to the forces above and below; whilst obliteration of the costophrenic sulcus ties down the margin of the diaphragm. When, further, the pleural thickening is generalized and the interlobar septa are also involved, the chest wall itself tends to become contracted, fixed, and immobile, and so scarcely alters the intrapleural pressure during inspiration.

The extent of the rise of the dome varies greatly after phrenicectomy. It may be barely 1 cm. or as much as 10 or 11 cm.; very rarely has it reached a height of 14 cm.

EFFECTS ON THE LUNG

Before we can appreciate the rationale of the indications and the results, it is essential to understand not only the changes in the diaphragm but also the

effect of these on the lung and the thorax in general. There is the influence on the lung of the paralysis of the hemidiaphragm, and of the loss of tone. There is also the influence of the rise into the thorax.

The diaphragm, by its descent, is responsible for the expansion of the lower and posterior parts of the lung; with one half paralysed there is the loss of this expansion force. The consequent deficiency of air entry into these areas of the lung can be observed clinically. To the loss of tone must probably be attributed the benefit of the diminution or disappearance of certain symptoms such as the diaphragmatic cough.

The effect of the rise of the dome on the lung is one which has given cause for much conjecture and argument. In the normal lung there is little doubt but that the greater part of the reduction in the hemithorax is absorbed by a collapse of the base of the lung due to relaxation of the elastic tissue; the higher the rise, the greater is the extent of the lung affected, but it is very unlikely to include the apex. If, however, there are consolidation changes at, say, the base of the lung that part is uninvolved, but the nearest areas of healthy lung tissue will contract.

When there is chronic fibrosis in the apex or upper lobe as a result of tuberculosis, a different mechanism comes into play. This mechanism is identical in principle with that found in the production of a selective collapse by artificial pneumothorax. The elasticity of the healthy parts of the lung will cause the partial collapse of the lung, if for any reason the negative pressure is reduced, but the elastic tissue being perfect it will at once yield again to the expanding force of an increased negative pressure. Pathological fibrous tissue is also ready to contract, given the opportunity, and so powerful is its contracting force that it can drag the chest wall and mediastinum towards each other, exerting a force of which the elastic tissue is quite incapable. When a rise of the dome occurs and the hemithorax becomes reduced in size, the elasticity in the adjacent lung fields causes a reduction of these areas; but the fibrous tissue in the upper lung field is even more responsive to the reduction in the hemithorax; it therefore contracts. During inspiration the increase in size of the chest and the increase in the intrapleural negative pressure calls for a re-expansion of the lung. The elastic tissue responds to this, but the fibrous tissue does not. The result is a gradually progressive selective collapse of that part of the lung which is fibrosed.

There are other factors, however, which have to be taken into consideration. Reference has already been made to the possible impeding influence of changes in the diaphragmatic pleura. Thickening of this membrane must interfere with the rise of the dome, and yet at times it is surprising to what extent the dome may rise after phrenicectomy despite a known thickening of the membrane. The filling-up and obliteration of the costophrenic angle does inevitably tie down the dome.

Further the presence of dense interlobar adhesions, the outer edge of which are fixed to the chest wall and with the radiogram showing a curved outline convex upwards, is almost certain to act as a barrier guarding the upper lobe from influences below it.

INDICATIONS FOR PARALYSING THE DIAPHRAGM

It is essential, when considering the indications for paralysing the phrenic nerve, to appreciate the object of the operation. There seems to be a prevalent view that it is done for the cure of pulmonary tuberculosis. Profound disappointment must be the fate of those who operate under this misapprehension. Phrenic paralysis often relieves symptoms, especially when it has been correctly advised to this end rather than to the treatment of the disease, but it is not a radical operation for 'cure'. It is but an asset in the treatment of the disease. Used properly, it is an immensely valuable one, helping to overcome or to diminish mechanical changes which are interfering more or less seriously with the progress of recovery. Like other

measures, it is an accessory to sanatorium treatment in the endeavour to increase the resistance of the body to the disease, the effective fibrosing of active tuberculous foci and the obliteration of cavities.

It is often stated that one of the indications for phrenicectomy is failure of artificial pneumothorax; in other words that a phrenicectomy should be done on every case on which an artificial pneumothorax has been tried and failed. It is possible that I have said this myself in the past, but I now assert emphatically that every case suitable for artificial pneumothorax is not necessarily suitable for phrenicectomy.

Artificial pneumothorax is attempted in cases of pneumonic tuberculosis and also in cases of the cascating, exudative form of disease. Possibly the immobilization of the dome which has been paralysed may be advantageous in a purely basal case; but, if the base is not involved and is the comparatively healthy part of the organ, phrenicectomy is definitely contra-indicated, since it will bring about collapse of the healthy part of the lung and leave the diseased pneumonic area unaffected.

Then again, artificial pneumothorax is frequently done in the hope of collapsing cavities, usually in the upper lobe or apex. When these cavities are large or are surrounded by dense fibrous tissue, it is expecting almost the impossible to try to obliterate them by a phrenicectomy. The operation is useful for some cavities, but not for this type. Nor is a lung with old-standing fibrosis and one or more cavities likely to benefit by phrenicectomy. If the condition is unilateral, the indication is a thoracoplasty, in some cases without even the preliminary trial of an artificial pneumothorax. A phrenicectomy would be valueless and might even be detrimental.

The indications for phrenicectomy in the treatment of pulmonary tuberculosis are divisible into four groups:—

- (1) For the treatment of pulmonary disease. In these cases the extent of the rise is the important factor.
- (2) For the treatment of past or present pleural involvement. In this group both the rise and the immobilization play an important part.
- (3) For the treatment of symptoms. In these cases it is not so much the rise of the muscle as the loss of tone and the immobility that is necessary.
- (4) In conjunction with other surgical measures.

THE PULMONARY LESION

The chronic fibrotic lesion is one of the types most responsive to phrenicectomy, but it is not all fibrotic lesions of the upper lobe which will respond to phrenicectomy. If the fibrosis is very dense and there are cavities, it will need a very exceptional rise of the dome to influence this, and even with such a rise, failure of an efficient collapse is more than probable. In such cases the cap of the lung is almost always firmly adherent and allows of no shifting of the lung surface; the whole of the collapse requisite to relax the fibrous tissue and to obliterate cavities would therefore have to be obtained by the upward displacement of the central part of the lung as a dome into the apex—an obvious impossibility. The probability therefore of a dense apical cap of adhesions and equally of dense interlobar thickening which acts as a barrier between the upper and lower segments of the hemithorax must be considered contra-indications. These cases, moreover, are eminently suitable for the major operations which will produce a permanent healing impossible by lesser measures.

A moderate degree of generalized fibrosis is, on the other hand, an indication for phrenicectomy. This type of case, even if the condition has been sufficient to produce some flattening of the chest wall and displacement of the mediastinum, may respond most favourably. It is in this group that is found pre-eminently the case which, having made considerable progress with rest in bed, reaches a stage with persistence of cough, sputum, and mild pyrexia beyond which

it seems incapable of responding, but after a phrenicectomy improves again progressively and may become symptomless.

Cavities surrounded by dense fibrosis or with thick walls cannot be expected to be favourably influenced by phrenicectomy. Small cavities, on the other hand, without well-defined walls, whether in the base, apex, or region of the hilum, and which have resisted rest in bed, may become obliterated following on a fairly high rise of the dome. The possibility of success is certainly sufficient to justify the operation.

It must be admitted, however, that there are very divergent views on the value of phrenicectomy in the treatment of cavities. Patronikola, for instance, says that out of 100 cases, 4 only were benefited. Russell reports control in 9 out of 21 cases at the Cheshire Joint Sanatorium in which artificial pneumothorax had failed or been ineffective. The results of Nehil and Alexander are very interesting: of 53 cases with a cavity of 2 cm. or less, closure occurred in 65 per cent; of 63 cases with a cavity of 2 to 4 cm., closure followed in 36 per cent; and in 32 cases with a cavity of 4 to 6 cm., closure occurred in 22 per cent. When the location of the cavity was in the upper third of the lung, closure was recorded in 40 per cent; of those located in the middle third, 31 per cent closed, and of those in the lower third, 29 per cent closed.

Phrenicectomy has many advantages over artificial pneumothorax. It is a single operation and the risks of complications are infinitely fewer; if successful, it does not interfere with future work as may be the case with an artificial pneumothorax. It is pre-eminently the moderately localized proliferative lesion, whether of the upper or lower lobe, which has responded up to a certain stage, yet incompletely, to rest in bed, for which phrenicectomy is indicated as the first line of attack in preference to artificial pneumothorax. The operation should take precedence also in some cases of isolated thin-walled cavities, particularly when a cavity develops in the contralateral lung in a case under treatment by artificial pneumothorax. The combination of phrenicectomy on the one side and of artificial pneumothorax on the other may prove very valuable in the treatment of bilateral disease.

PLEURAL INVOLVEMENT

The second group of cases for which phrenicectomy is indicated is that in which an old or recent pleurisy has been responsible for thickening of the basal costal and diaphragmatic pleural membranes with obliteration of the costophrenic sulcus, and fixation and possibly distortion of the diaphragm. In these cases comparatively little immediate rise can be expected; nor is that the object of the operation so much as the paralysis and loss of tone.

The third group of indications is for the treatment of symptoms, a group far too often neglected. The first and most important, though not the commonest symptom which may call for an emergency phrenicectomy is hæmoptysis. Several cases have been recorded of intractable bleeding for which artificial pneumothorax had proved impossible but which have stopped abruptly after phrenicectomy; in some the bleeding came from the upper and in others from the lower lobe. Alexander gives preference to phrenicectomy over pneumothorax for the arrest of bleeding.

RELIEF OF SYMPTOMS

So far I have discussed the treatment of the disease. With healing there must naturally be improvement of symptoms, lessening of cough and sputum, pyrexia, disappearance of tubercle bacilli, and so on. The improvement in the cough and sputum may occur long before there is time for healing processes to take place. A working diaphragm is not necessary for bringing up and expelling sputum. Often as a result of the disease spasm, and this actually hampers expectoration. With paralysis of the dome, the full force of the contraction

of the abdominal muscles is transmitted directly to the thorax, and facilitates expectoration.

Adhesions between the lung and diaphragm may cause a diaphragmatic cough—a spasmodic cough which is started by movement, laughing, even talking. This can be abolished by paralyzing the dome, to the intense relief of the patient and with considerable benefit to the lung. The morning vomiting brought on by the pumping of the dome on the stomach with the initial emptying of the bronchial tubes of accumulated sputum after sleeping can also be stopped by a phrenicectomy.

Patients who have had pleurisy, whether the associated disease is still active or quiescent or healed, may experience dragging aches, pains, or discomfort round the base of the chest. The relief that can be given by paralyzing the dome justifies the operation for this alone. Such pleurisies not infrequently implicate the pericardium, when the drug is liable to produce tachycardia on comparatively slight exertion. This too will be relieved by the relaxation of the dome.

AN ADJUVANT TO OTHER OPERATIONS

The final group concerns the indications for phrenicectomy in conjunction with other operative measures. The first to be considered is the combination with artificial pneumothorax. Reactions and effusions during the maintenance of artificial pneumothorax are more likely to occur and recur when there are adhesions which are stretched by each refill. Paralysis and rise of the dome may relax these bands and thus for the time being remove the irritation and lessen the tendency to reaction and effusion. If the adhesion is so placed that the tension is not relieved, no benefit will have been gained as regards these manifestations. Apart from this, phrenicectomy has no benign influence on effusions. It does, however, in certain cases undoubtedly enable the interval between refills to be lengthened.

The rise of the paralysed dome may aid somewhat in cases where the base of the lung is adherent or there is a progressive obliterative pleurisy. A high rise of the dome may be invaluable in certain cases of suspended cavity, converting occasionally an artificial pneumothorax which is a failure into a success.

When a lung, involved by a disease which produces fibrous tissue changes, has been long collapsed and is then allowed to re-expand, a considerable strain must be imposed on the originally diseased fibrotic area and on the walls of old cavities, when that lung re-expands. The hemithorax is admittedly smaller than at the onset, because the chest wall has shrunk and the mediastinum has come across, whilst the healthy alveoli have become emphysematous; yet it seems most advisable further to relieve the strain by raising the height of the dome by paralyzing it.

Finally, there is the much debated question of phrenicectomy in conjunction with major operations. There are certain cases in which it is advisable to have the dome paralyzed some time before the operation so as to help the cough and expectoration, reduce the pyrexia, and improve the general health of the patient. For these, a preliminary phrenic crush only should be done so that recovery of the function of the dome is returning approximately coincident with convalescence from the major operation. If a total thoracoplasty is indicated the motionless dome will, in my opinion, have a detrimental, rather than a beneficial, effect on the collapsed lung. When the operation is one localized to the apex or upper lobe, the raised dome is more likely to put healthy basal lung tissue out of action than to produce any appreciable collapse of the apex.

It is extremely doubtful if a paralysed dome has any influence in preventing an aspiration pneumonia during the operation. Its other supposed value as a test for the contralateral lung seems to me to be worthless.

The statement has just been made that a phrenic nerve crush should be done in preference to a phrenicectomy whenever the diaphragmatic paralysis is a prelude to a total or localized thoracoplasty or to an apicolysis. The phrenic crush is also the preferable

operation in every case where the base of the lung is not affected and the influence on the lesion is of considerable doubt. It is also preferable in cases with bilateral disease when the operation is an emergency one to check bleeding. Matson says that 'a return of diaphragmatic function can be expected in 25 to 30 per cent of all cases, unless all communicating or accessory fibres have been resected'. Bonniot and Foix noted a return of function in 8 per cent when the evulsed nerve was over 10 cm. in length, and in 29 per cent when the length was under 10 cm. Lindberg found that no improvement resulted when the total elevation of the paralysed dome was less than 3.9 cm. In 80 per cent of his cases there was a secondary rise averaging 2 cm.; the maximum rise was usually not reached under three months. Matson records a case with an initial rise of 3 cm., a further rise of 6.5 cm. in the ensuing year, and a total rise of 13 cm. by the end of the second year.

RESULTS

Many papers have been written and figures given showing the late results of phrenicectomy with the percentage 'cured', improved, and so on. The general opinion is that considerable benefit can be obtained in suitable cases. Yet there are a few like Gravesen who consider 'that the actual efficacy of the operation has been greatly exaggerated by many', and that the indications are very limited. He finds that there were 'only 27 cases (out of 153 available for "true statistical analysis") where we have any right to say the patients were healed as the result of the phrenic operation'. Those figures are, in my opinion (though not in Gravesen's), most encouraging, because I would again emphasize the fact that phrenicectomy must not be looked upon as a 'curative' measure, but as an auxiliary and ancillary measure to other forms of treatment.

For this reason I make no attempt to give figures as to results. It is not possible to produce anything like an accurate statement. In some cases the operation is done with a certainty of benefit to be gained either as regards the disease or the relief of symptoms; in others there is a reasonable possibility of benefit. In yet others a crush is indicated as, while the result is doubtful, there is a possible hope of success. In a disease like tuberculosis, with its disappointments and surprises, this success must be sought for, at times even at long odds.

Berry collected in 1930 the records of 4,697 cases of phrenic nerve paralysis with a mortality of 26 cases. Of the deaths 6 were due to bleeding from extraction of the nerve and 2 to a traumatic emphysema and empyema associated with a traumatic pneumothorax. These 8 cases were unquestionably accidents associated with evulsion of the nerve. Lung embolus and oedema accounted for 3 deaths, and dyspnoea and heart failure for another 3. There were 12 deaths from pneumonia and tuberculous dissemination. Of these 12, 5 were reported by Loewenthal who regarded the condition as an 'unspecific pneumonia' due to injury to the pleura while evulsing the nerve. Another possible explanation is that during evulsion the dome gets drawn up into the thorax. At the moment that the nerve filaments give way the diaphragm returns with a sudden, violent descent which may easily cause the aspiration into the lower lobe of secretion squeezed out into the bronchi during the period of elevation. Death from syncope has also been recorded at the moment of evulsion. It is phrenic evulsion not phrenicectomy which is the operation which carries the immediate grave risks. I have seen 3 cases of spontaneous, symptomless, partial pneumothorax occur within a week of evulsion.

The most important of the later complications are those due to the displacement of the stomach and duodenum and the dislocation of the oesophageal opening. Vomiting occurs very occasionally immediately after paralysis of the left dome, but usually subsides in a day or two. Digestive disturbances, flatulence, and hiccorygmi may last somewhat longer.

It is rare for these even to be serious in character or of lasting duration. The most troublesome complication in my series—and I am well on in my second thousand—has been the persistence of horchorygmi for eight months, when it rapidly disappeared. Digestive discomfort has been recorded after paralysis of the right dome due to traction on the first part of the duodenum.

Radiological examinations show, according to Longuet and Lamay, that with a high rise of the left dome the stomach is elongated and shows a large air space. Of more serious consequence is, however, the condition similar to that found with eventration of the diaphragm, a rotation, producing a partial volvulus of the stomach, causing a constriction across the length of the organ.

Symptoms may therefore be produced by constriction of the œsophagus, of the stomach, or of the duodenum. In the majority of the cases the symptoms are slight and transitory. Very rarely only are they of serious import, and they may then be associated with cardiac or pulmonary manifestations, such as tachycardia or dyspnoea. Dyspnoea of a mild grade may also be observed independently of the above complications. It may persist for two or three weeks and then subside as compensation and adjustment take place.

Favourite Prescriptions

By J. E. M. WIGLEY, M.B., M.R.C.P.

(From the *Practitioner*, Vol. CXXXV, September 1935, p. 352)

THE earliest Pharmacopœia of St. John's Hospital which I have been able to obtain was published in 1898, and is a more bulky book than either of its successors of 1912 or of 1926. Another revision, which does not differ appreciably in size from the one published in 1926, is in the press. One of the most notable differences is in the number of mixtures; in 1898 there were 37 mixtures, in 1912 the number was reduced to 31, in 1926 to 21, and in the forthcoming revision the number rises to 27, but this increase is largely due to an increase in the number of the honorary staff of the hospital, each member naturally ordering his own particular prescriptions. It cannot be taken to indicate any retrograde step towards a belief in the 'humoral' cause of skin diseases.

Another noticeable change is in the number of *balnea* or *medicated baths*; in 1898 these were 8, but by 1912 they were reduced to 4, at which number they have remained. Of these two only, the *balneum alkalinum* and the *balneum furfuris*, are used at all frequently. Quite rightly the sulphur bath has disappeared as it was always far more effective in causing sulphur dermatitis than in curing scabies. Strange to say, it is still used by certain public authorities. The medicated vapour baths of 1898 have completely disappeared, chiefly because they were found to be both an unreliable and an irritating method of using the particular drug. It is so much more satisfactory to inject a measured amount of mercury into the gluteal muscle than to irritate the whole skin, and still have a very remote idea of how much mercury has been absorbed.

Cautics, as such, too, have disappeared, though *Liquor hydrargyri acidi nitratis* is still the most popular in the treatment of lupus vulgaris. The solid stick of silver nitrate, 'lunar caustic', still has many valuable uses, but the modern treatment of neoplasms with radium and x-rays, of lupus with ultra-violet light from various sources, and of warts and similar tumours by various electrical methods, has done away with the necessity for many of the drastic, it might almost be said barbarous, methods of our ancestors.

One very useful addition, made in 1926 and retained, is the *Cataplasma amyli* for the making of which Sir Norman Walker gives such clear directions. It is a remedy which is far too little used, probably as it is too little known. It is certainly one of the very safest

remedies to apply to an inflamed, weeping or crusted surface and many cases of infantile eczema can be completely healed by its continued use alone.

The *creams* appear under that name in 1926, though the calamine cream has reverted to its original name of *Linimentum calaminæ*. It appears in the National Formulary as the *Lotio calaminæ oleosa*, though the consistency of it is really that of a cream. Cream applications are far less frequently used in general practice than their special virtues call for. They make a very excellent half-way house between a lotion, which so often proves drying as used by a patient who can only change his dressing morning and evening, and an ointment, which proves irritating to an inflamed, weeping or crusted surface. The ointment acts as a more or less waterproof covering, prevents evaporation and dams back the exuding serum, and many acute eruptions would be checked in their earlier stages by the use of a simple cream. The *Cremor zinci* is an excellent formula, as follows:—

R. Zincii oxidi	..	..	180 grains
Lanolini	..	..	240 grains
Liquoris calcis	}	..	of each 1 ounce
Olei olive		..	

Using this as a base 10 minims of ichthammol, or *Liquor picis carbonis* may be added so as to exert a more anti-pruritic effect.

Plasters number eight as compared with ten in 1898 but by far the most commonly used are varying strengths of salicylic acid for macerating horny excrescences, such as warts and corns, and salicylic acid combined with creasote which is chiefly used in the treatment of warty tuberculosis (*verruca necrogenica*).

The *gargles* have been reduced from four to two, chiefly because practitioners, and sometimes patients, are more discriminating in their choice of hospitals, and diseases of other systems of the body are seldom seen at a hospital primarily intended for diseases of the skin.

Unna's zinc gelatin is still retained (combined with ichthyol) as, in spite of the great influx of ready-made bandages, it still remains the best supporting application for many cases of varicose eczema and its frequently associated ulceration. As a protective or 'occlusive' application in many chronic itchy and 'lichenified' patches and even in self-produced or artefact eruptions, Unna's dressing is invaluable. In the National Formulary it is called *gelatinum zinci* (Unna's paste).

The sclerosing treatment of varicose veins, which really owes its great modern impetus to the shortage of men in the French army about 1915, is responsible for the appearance of the *injection quinine et urethane*. Opinions still vary greatly as to the efficacy of the various sclerosing fluids which can be used for the injection of varicose veins, but the majority of the staff at St. John's Hospital were of the opinion that quinine-urethane had more advantages than disadvantages, and so it was the one selected for inclusion in our Pharmacopœia.

Only two *liniments* appear in the latest Pharmacopœia, of which *Linimentum calaminæ* (which is the *Lotio calaminæ oleosa* of the National Formulary and of many other hospital pharmacopœias) is the chief. So many commercial firms put up an excellent preparation of this that it is seldom necessary to write the prescription for it, but the one given here makes up very well. It is:—

R. Calaminæ	..	..	40 grains
Zincii oxidi	..	..	20 grains
Liquoris calc.	}	..	of each ½ ounce
Olei sesami		..	

It may be used as a base for many other medicaments, and is undoubtedly the chief, if not the only, constituent of most of the 'beauty parlour' preparations sold under the enticing names of 'foundation lotion' and other similar titles. The *Linimentum acid salicylic* compound is a most useful application for

mild cases of dandruff or pityriasis sicca and is also mildly stimulating for seborrhœic types of alopecia:—

R Acidi salicylici ..	25 grains
Aleohol (60 per cent) ..	60 minims
Oleum ricini ..	to 1 ounce

For use in private practice the not very pleasant odour of the castor oil may be masked by a few drops of oil of lavender or rosemary.

Lotions

The lotions show a rather striking increase in number, as in 1898 there were 18 and now there are 28. This increase is partly due to listing small variations as different lotions, as, for example, *Lotio calaminæ cum pice*, which is calamine lotion with the addition of liquor picis carbonis, 8 minims to 1 ounce. The world-famous calamine lotion, like the liniment, is now put up so well by so many firms that writing of the detailed prescription is seldom called for. The formula favoured at St. John's Hospital is:—

R Calaminæ prep. ..	..	} of each 20 grains
Zinci oxidi ..	..
Glycerini ..	..	30 minims
Liquoris calcis ..	..	300 minims
Aquam destillatam ..	..	to 1 ounce

It also masquerades under various attractive names of which 'sunburn lotion' is one of the most popular. A very effective though apparently not widely known value of calamine lotion is its mildly antiseptic and drying effect on the lesion of impetigo contagiosa.

Here it may be noted is the excellent *Lotio d'Alibour* or *Lotio cupri et zinci sulphatis* which is also in the National Formulary, and is very effective in the treatment of impetigo. The formula is:—

R Cupri sulphatis ..	..	4 grains
Zinci sulphatis ..	..	6 grains
Aquam camphoræ ..	..	to 1 ounce

A very useful lotion for the treatment of acne vulgaris is the *Lotio calaminæ cum sulphure*, which contains 10 grains of sulphur to the ounce of calamine lotion and is usually quite as efficacious as the *Lotio sulphuris et zinci*, the formula for which is:—

R Sulphuris præcipitata ..	..	} of each 15 grains
Zinci sulphatis ..	..
Potassi sulphidi ..	..
Aquam destillatam ..	..	to 1 ounce

Soothing and cooling lotions are well represented by the *Lotio picis carbonis*, the *Lotio plumbi acetatis* and the *Lotio plumbi cum zinco*, though it is noticeable that the *Lotio picis et plumbi* of the National Formulary does not find a place.

For the promotion of hair growth on the scalp the *Lotio stimulans* is the result of prolonged experience and the formula is:—

R Tinctura cantharidis ..	..	30 minims
Liquoris ammoniæ fortis ..	..	60 minims
Glycerini ..	..	60 minims
Aquam destillatam ..	..	to 1 ounce

If dandruff or a seborrhœic condition of the scalp calls for attention the *Lotio resorcini* is very serviceable, while the *Lotio hydrargyri et resorcini* has stood the test of time:—

R Hydrargyri perchloridi ..	..	1 grain
Resoreini ..	..	5 grains
Olei ricini ..	..	10 grains
Aleohol (60 per cent) ..	..	to 1 ounce

Mixtures

Of the mixtures, the number of which as already mentioned has risen again to 27, *Mist. alba* is as popular in the treatment of skin conditions as in most other branches of the healing art. In fact there are few diseases in which its judicious use is not beneficial. Arsenic, which at one time was regarded almost as a dermatological 'cure-all', is present in three prescriptions, the *Mistura acidi arseniosi*, the *Mistura arsenicalis alkalina*, and the *Mistura ferri arsenicalis*. Though it

is still of value in certain diseases associated with derangement of the normal process of the formation of horn cells, such as psoriasis, it is far more frequently used for its general tonic properties. The unfortunate results which may still sometimes be seen from its too prolonged ingestion have led in some cases to its too complete abandonment, but there can be no doubt that, used in moderation, it is a most valuable drug. Quinine is a remedy favoured by many in certain dermatoses, particularly lupus erythematosus and the *Mistura quiniæ acida* is a very useful variation from the plain quinine tablets. Many cases of seborrhœic dermatitis are benefited by the administration of alkalis and the following *Mistura alkalina* is a very useful prescription:—

R Sodii bicarbonatis ..	..	30 grains
Potassii bicarbonatis ..	..	25 grains
Potassii citratis ..	..	20 grains
Tincturæ cardamomi compositæ ..	..	30 minims
Aquam ..	..	to ½ ounce

For the relief of irritation, which is often such a difficult problem in dermatological treatment, the *Mistura potassii bromidi* may be valuable, though a suitable external application is usually more effective, and the bromide mixture is more useful in soothing the exhausted nervous system than in directly affecting the itching cutaneous covering. The *Mistura nucis vomicæ sedativa*, which appears in the London Hospital Pharmacopœia as the *Mist. pot. brom. co.* or 'antichlamberic mixture', is a most valuable remedy for the 'nervous depression' so common in older patients suffering from an intermittently itching condition. It is often seen at its best in cases of senile pruritus and the formula is as follows:—

R Potassii bromidi ..	..	10 grains
Tincturæ nucis vomicæ ..	..	10 minims
Spiritus ammoniæ aromatici ..	..	20 minims
Infusum gentianæ ..	..	to ½ ounce

For the treatment of rosacea, with its usually attendant gastric disturbances, there are two acid mixtures. The simple *Mistura gentianæ acida* is practically the same in all pharmacopœias, and the *Mistura acida strychninæ* is preferable in cases of lack of general tone, as follows:—

R Acidi nitro-hydrochlorici diluti ..	5 minims
Liquoris strychninæ hydrochloridi ..	2 minims
Aquam destillatam ..	to ½ ounce

The *Mistura hydrargyri perchloridi* is a mixture much favoured in the treatment of lichen planus and of necessity the *Mistura hydrargyri biniodidi*, as follows:—

R Liquoris hydrargyri perchloridi ..	30 minims
Potassii iodidi ..	5 grains
Infusum quassia ..	to ½ ounce

is invaluable in dissolving the granulomas of tertiary syphilis.

Antimony wine does not appear to enjoy the popularity it deserves and the judicious use of the *Mistura vini antimonialis* in the early or eruptive stages of many inflammatory diseases, such as psoriasis or lichen planus, will give very gratifying results. The formula:—

R Magnesii sulphatis ..	..	20 grains
Vini antimonialis ..	..	10 minims
Aquam destillatam ..	..	to ½ ounce

Salicin and sodium salicylate are both very useful in relieving the joint pains associated with certain skin diseases such as erythema nodosum, peliosis rheumatica and certain types of psoriasis and each is prescribed in a familiar mixture:—

R Salicini ..	..	15 grains
Pulveris tragacanthæ ..	..	q.s.
Aquam ehloroformi ..	..	to 1 ounce
R Sodii salicylatis ..	..	10 grains
Sodii bicarbonatis ..	..	10 grains
Aquam menthæ piperitæ ..	..	to ½ ounce

No pharmacopœia would be complete without the appearance of calcium, though it is open to grave doubt whether such a simple prescription as the following is at all an effective way of administering this drug:—

R Calci lactatis .. 20 grains
Aquam menthe piperitæ .. to 1 ounce

This is necessarily a somewhat sketchy account of the internal remedies in our Pharmacopœia, but it will emphasize the well known fact that there are really no specific internal remedies for skin diseases. The increasing modern favour for the administration of drugs by injection also has had its effect.

Pastes

Returning to the forms in which external remedies may be applied one comes first to the extremely valuable pastes. These are semi-porous applications made by the addition of a quantity of some bland absorbent powder to the ointment basis and are less irritating than ointments as the powder absorbs the discharges. Pastes may be said to combine the effects of an ointment and a powder. They should be applied to the skin either by being rubbed in or by being spread on linen or muslin and held in position by a bandage. Should they become caked over the skin, they may be removed by olive oil, and they are not suitable for use on hairy parts as they are apt to mat the hairs together or to plaster them down to the skin. The classical example is the Pasta zinci with which the name of Lassar is always associated. It is:—

R Zincii oxidi of each equal
Amyli parts to make
Adipis lanæ hydrosi
Paraffinum molle 1 ounce.

As Sir Norman Walker remarks: 'It is interesting to note that Erasmus Wilson, to whom the popularity of zinc ointment is due, used to vary the amount of zinc oxide in his prescription, and his "stiff" zinc ointment was really the pioneer of the pastes'. Any drug may be incorporated in this paste, the amount of powder being diminished if the added constituent is bulky and dry. Salicylic acid is frequently added for its softening effect on the horny layer of the epidermis, and the prescription for the Pasta acidi salicylici as it is then called becomes:—

R Acidi salicylici .. 10 grains
Zincii oxidi .. 120 grains
Amyli .. 120 grains
Paraffinum molle .. to 1 ounce

To this may be added dr. i of Liquor picis carbonis if a more anti-pruritic effect is desired. If the effect wished for is more antiseptic the Pasta monsol (15 minims monsol to the ounce of Pasta zinci) will be found most useful.

The Pasta resorcini compound is used in its three increasing strengths for its desquamating effect in the 'peeling' treatment of acne vulgaris and the prescriptions are as follows:—

R Resorcini ..	10 grains	30 grains	60 grains
Sulphuris ..	10 grains	30 grains	60 grains
præcipitata			
Zincii oxidi ..	180 minims	180 grains	120 grains
Paraffinum ..	to 1 ounce	to 1 ounce	to 1 ounce
molle.			

Pigmenta or paints are employed either as a vehicle for various drugs in a spirituous solution or as a protective coating. The Pigmentum viride is a very popular example of the former and is largely used in the treatment of superficial pus infection of the skin. It is also effective in the ringworm infection between the toes which goes by various names, such as 'athlete's foot', 'Hong Kong foot' and 'Bombay rot'. The prescription is:—

R Viridis malachiti .. 5 grains
Hydrargyri perchloridi .. 5 grains
Alcohol (60 per cent) .. 360 minims
Aquam to 1 ounce

For the combination of a drug with a protective covering the Pigmentum acidi salicylici is a good example, as follows:—

R Acidi salicylici .. 1 drachm
Collodium flexile .. to 1 ounce

The addition of 20 minims of the extract of cannabina indica makes the very familiar 'corn paint'.

Of pills very much the same may be said as of mixtures. They are of value in treating such conditions as may coexist with the skin disease and none are specifics though the Pilula hydrargyri iodidi viridis sometimes seems to affect warts like the proverbial charm and the Pilula ichthyol is said to reduce cutaneous congestion and is often employed in the treatment of rosacea when acids appear to fail.

Powders

Dusting powders are most valuable and they may be used for their protective, absorbent, astringent, anti-pruritic and antiseptic properties. They should be carefully prepared and repeatedly sifted, so that they are practically impalpable and wholly free from grit. Their protective effect is largely due to their acting as a 'dry lubricant' (like graphite in certain parts of machinery) and for this action the many talcum powders on the market are excellent. In fact the bulk manufacture of these powders is so good nowadays that individual prescribing is seldom necessary. Powders may be simply dredged on to the affected surface or if a more prolonged action is required they may be quilted into muslin bags and fixed with a bandage. For an acutely inflamed surface they have a most cooling effect as each particle helps to radiate the heat, and on an oozing or weeping surface the absorbent powders are of value in drying the skin and reducing œdema. In this latter connection starch powders are not to be recommended as the starch is liable to cake and ferment. The stearate of zinc is a better powder for this purpose. The simple Pulvis acidi borici cum zinco combines the protective and antiseptic properties very well as follows:—

R Pulveris acidi borici .. 1 part
Pulveris amyli .. 2 parts
Zincii oxidi .. 3 parts

A rather more antiseptic powder which is also mildly astringent is the Pulvis acidi salicylici compositus:—

R Acidi salicylici .. 3 parts
Pulveris amyli .. 10 parts
Pulveris talei .. 87 parts

whilst if antiseptics is the chief object the Pulvis hydrargyri subchloridi compositus may be used:—

R Hydrargyri subchloridi .. 2 parts
Pulveris acidi borici ..
Pulveris amyli .. of each 7 parts

When the astringent and anti-pruritic effect is the chief one sought the sub-gallate of bismuth, marketed under the trade name of 'dermatol', will be found very suitable.

The hopelessness of competing with the myriads of excellent soaps on the market is reflected in the fact that only three formulae are given. Far too much is made of the alkali in soap to the neglect of its other constituents. When any soap is mixed with water a certain amount of alkali is of necessity set free, and it is to that that the cleansing effect of the soap is largely due. Probably most of the irritation caused by soaps is due to the unsuitable rancid fats used in their preparation or to the perfume and dyes, and it must always be remembered that idiosyncrasy plays a large part in the irritation of soaps. 'One man's cleanliness may be another man's irritation'.

Medicated soaps sound most attractive but in practice they really have very little specific value. They do not carry the drug with them as ointments do and their dose is completely uncertain. In acne vulgaris, however, a sulphur soap is often quite useful, especially as it may be the only form of treatment that male

patients will carry out with any degree of regularity. Still, even here, the chief effect is probably due to the soap rather than its accompanying drug.

The *Solutio saponis* (equal parts of *sapo viridis* and alcohol) or scented with 15 grains of thymol ad 1 ounce is a very useful shampoo.

Ointments

Ointments are by far the most commonly used of the greasy preparations and are often most efficacious methods of acting on the skin by means of various drugs. The choice of a proper base is most important and it is of great interest to note that vaseline (*paraffinum molle*) has very largely replaced lard or benzoated lard in the latest pharmacopœia. In fact it is the base used in 33 out of the 43 formulæ given whereas in 1898 about an equal number of ointments were made up with lard and with vaseline. This is largely explained by the comparative cheapness of vaseline as well as the fact that it does not go rancid. Vaseline may prove irritating to sensitive skins when other bases may be used. It may also be combined with lanoline (*adepts lanæ*) to give greater consistence.

Ointments may be bland or protective, astringent, keratolytic, antiseptic, stimulating, or sedative. The effect will vary according as they are rubbed in, smeared on or applied thickly on linen with or without a waterproof covering. Needless to say the last method produces the most powerful effect. Simple bland or protective ointments nearly all contain zinc oxidi and may easily be rendered mildly sedative by adding 10 to 15 minims of *Liquor picis carbonis* or 1 drachm of *Liquor plumbi subacetatis fortis* as in the following:—

R. Liquoris plumbi subacetatis diluti 60 minims
Unguentum zinci to 1 ounce

The combination of mild antiseptics in a mildly sedative ointment is well exhibited in the following *Unguentum acidi borici cum eucalypti*:—

R. Acidi borici 1 grain
Olei eucalypti 10 minims
Paraffinum molle to 1 ounce

which will frequently be found to be a very 'healing ointment'. This ointment is very similar in its effect to the *Unguentum Z. E. B.* of the National Formulary.

The chief keratolytic ointments contain salicylic acid in varying strengths and may with advantage be combined with drugs of the 'reducing agent' type such as chrysarobin or mercury in the treatment of psoriasis. The *Unguentum petrol. compositum cum acid salicylic* is one of the most used formulæ for psoriasis:—

R. Liquoris picis carbonis .. 60 minims
Hydrargyri ammoniati .. 15 grains
Acidi salicylici .. 20 grains
Unguentum paraffini .. to 1 ounce

The combination of benzoic acid with salicylic acid (known the world over as Whitfield's ointment) is a powerful antiseptic as well as keratolytic and remains the best remedy for tinea infection of the glabrous skin, in spite of countless rivals of the aniline dye and other types of chemical. Whitfield's original prescription is closely followed and it is to be noted that coconut oil is included in the base:—

R. Acidi benzoici 25 grains
Acidi salicylici 15 grains
Paraffini mollis 120 grains
Olei cocois nuciferæ .. to 1 ounce

Two ointments are included which are very effective in treating seborrhœa, particularly of the scalp. The *Unguentum acidi salicylici cum sulphure* is best when there is little inflammatory reaction and its action on seborrhœic dermatitis of the body is most successful:—

R. Acidi salicylici 10 grains
Sulphuris præcipitata .. 15 grains
Adepm benzoinatum .. to 1 ounce

When there is considerable inflammatory reaction with much crusting of the scalp the *Unguentum cocois compositum* will frequently give better results:—

R. Liquor picis carbonis .. 60 minims
Sulphuris præcipitata .. 20 grains
Acidi salicylici .. 10 grains
Olei lavandulæ .. q.s.
Olei cocois nuciferæ .. to 1 ounce

The addition of 2 per cent oil of cade will add to its sedative effect.

The *Unguentum acidi carbolici cum menthol* is an excellent one for relieving irritation and the pain of ulcers, but it must always be borne in mind that the action of ointments of this type is always temporary and the irritation is very apt to return with renewed force when the first effect of the application has 'worn off'. The same comment applies to the very effective proprietary ointment known as 'percainal'. The formula of our hospital ointment is:—

R. Acidi carbolici 10 grains
Menthol 5 grains
Zinci oxidi 30 grains
Adepm benzoinatum .. to 1 ounce

Another useful anti-pruritic is the *Unguentum naphthol*, which has also the virtue of being an anti-scabies application. Its use is often very valuable in cases of papular urticaria, when the possibility of an added scabies infection may be difficult to exclude:—

R. Naphthol 22 grains
Olei sesami 360 minims
Paraffini duri 30 grains
Paraffinum molle to 1 ounce

In this summary of our 'Favourite Prescriptions' I have tried to indicate what sort of application has been found by experience to be most suitable to the different stages of skin diseases. It will be seen that many of the more modern and specialized medications, such as the various preparations of the gold salts, are not included. These medicaments are still rather *sub judice* both as to the indication for their use, their dosage and effects and it was felt the time had not yet come for their inclusion in the *Hospital Pharmacopœia*. The large firms of manufacturing chemists now put up so many of these applications in a so much more elegant form and of necessity less expensively than by the dispensing of small quantities that the art of writing elegant prescriptions is unfortunately likely to fall more and more into disuse.

Reviews

A GUIDE TO HUMAN PARASITOLOGY FOR MEDICAL PRACTITIONERS.—By D. B. Blacklock, M.D. (Edn.), D.P.H. (Lond.), D.T.M. (Liver.), and T. Southwell, D.Sc., Ph.D., A.R.C.Sc., F.Z.S., F.R.S.E. Second Edition. 1935. H. K. Lewis and Company, Limited, London. Pp. vii plus 259, with 2 coloured illustrations in the text. Price, 12s. 6d.

THE second edition of this book has appeared only four years after the first which is evidence that it has found a ready demand.

Although the original edition was kept down to the barest necessities the authors have managed to reduce it another twelve pages on this occasion by removal of non-essentials.

In the reviewer's opinion this book's chief value will be to students preparing for an examination of the standard of a Diploma of Tropical Medicine, for only the important parasites are described fully, the less important (non-pathogenic) ones being omitted or briefly described in small print. Thus for a student to use this book successfully he will need amplification of the facts given and this can only be done by a teacher during the practical classes. It is of course essential that a

properly trained student must be able to recognize with certainty all the pathogenic parasites he will encounter, but unfortunately unless he is also able to distinguish the non-pathogenic ones he may be misled into applying unnecessary or incorrect treatment to his patients.

It is admittedly extremely difficult for a student previously unacquainted with parasitology to acquire a working knowledge of all the parasites that can infect man, in the short space of an average diploma course, therefore the more experienced teachers in these subjects become the more are they inclined to reduce the amount of instruction given. The authors of this book have performed a valuable task in producing this volume of essentials, but it is doubtful if in some instances they have not perhaps gone a little too far in their efforts to make the subject easy.

Nevertheless, if the reader bears constantly in mind that the word *guide* in the title is to be taken literally he will not be disappointed.

The numerous tables and the illustrations of the life histories of many of the parasites, especially the helminths, will be found a great help in looking up and rapidly reminding one of the salient points in these often complicated cycles, and they greatly add to the value of the book.

To sum it up, this book is the best the reviewer has seen for the use of a student, when he has a teacher at his elbow ready to amplify the information it supplies, but it is not full enough for a book of reference for an isolated medical man working where parasitology is an important part of his practice.

P. A. M.

TRANSACTIONS OF THE NINTH CONGRESS HELD IN NANKING, CHINA, 2ND TO 8TH OCTOBER, 1934. (FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE.)—Edited by Wu Lien-Teh, and C. Y. Wu. Volumes I and II. 1935. Published by the National Health Administration, Nanking, Republic of China. Pp. xiv plus 790 in volume I and pp. x plus 1000 in volume II. Illustrated with numerous plates, charts and tables. Price, £2 per set of two volumes

ONE of the most remarkable things about these two volumes of *Transactions* is the promptitude with which they appeared. It is usually the fate of published transactions to appear so late that everybody has entirely lost interest in them, and, if the conference is an annual one, they usually arrive just in time for the next conference; even in the case of this association where there was an interval of two years between congresses (the interval is now three), there was sometimes a very close race between the next congress and the transactions of the preceding one. China is traditionally an easy-going and fatalistic country, where to-morrow is as good as to-day and the week after next better still, but Doctors Wu Lien-Teh and Wu have belied tradition; the first volume of these *Transactions* was delivered in India within five months of the conclusion of the Congress. (We regret that we have let down this country by delaying the publication of this review, but at one time we hoped to be able to publish a short résumé of all the important papers delivered at this Congress, as we did in the case of the 7th Congress, but we had to abandon the project).

Though the *Transactions* appeared in record time, there are no signs of hurried publication in the volumes themselves. The first 80 pages are devoted to such necessary matter as lists of members, delegates, and office holders, minutes of meetings, resolutions passed, addresses of welcome from the Chinese authorities, and other speeches at the various official functions connected with the Congress. These last-named are by no means the usual formal matter, but give one an insight into the way that the Chinese government is attempting to tackle the medical problems of China. They have realized that in these days a

government is judged more on the efficiency of its medical services than on any other single branch of its administration. The addresses of H. E. President Wang Ching-wei who took a great personal interest in the Congress will be read with special interest, as also will those of that very gifted speaker H. E. Dr. J. Heng Lin, the President of the Congress. Those who have met the former at the Congress will have read with great regret that he has recently been wounded when an attempt was made on his life.

The remaining 1700 pages of the two volumes are devoted to the scientific papers and the discussions that followed their delivery. Many of these papers are important contributions to the literature of tropical medicine, and though some of them have been reprinted in other journals the majority have not, so that no medical library in the East can afford to be without these *Transactions*.

The papers are numerous and the subjects are diverse; we cannot therefore attempt to refer to them all, nor do we feel competent to single out the most important.

In a paper on dysentery in the Japanese navy, it is interesting to read that Shiga dysentery is as rare in Japan as it is in India, and that in practically all the cases that occurred, the infection was picked up in Shanghai. The majority of dysentery strains isolated were of the Flexner- and Miss-Y' groups. These of course could be subdivided into minor groups, and for epidemiological investigations it is important that they should be, but for bacteriological identification it is only necessary to use the two major group sera.

Dorothy Wong, of the Peiping Union Medical College, came to the conclusion that an agglutinating titre of 1 in 80 in a serum was sufficient evidence of the existence of dysentery at some time of life, in the case of the Flexner-Y' group, and that 1 in 40 was sufficient in the case of the Shiga organism; she found that the sera of new-born babies contained no agglutinins against *B. dysenteriae*.

Dr. Tao found that the majority of the meningococcal strains isolated in China are of group I, that is types I and III; this is very much what we have found in India; only here we appear to have found a larger number of strains that do not fall into any of the recognized groups.

The reviewer was particularly interested in a paper by Dr. Chester Frazier on the cutaneous manifestations of vitamin-A deficiency. At the Congress there were many photographs shown; these were very suggestive of the type of unhealthy skin that one sees in India; unfortunately only two of his photographs have been reproduced. The condition is very much like that described by Nicholls as phrynoderma. There seems to be little doubt regarding the specific nature of the lesions as they occur so frequently in conjunction with other recognized vitamin-A deficiency conditions.

Dr. Reiss of Shanghai has suggested the use of the serum of patients suffering from lymphogranuloma inguinale instead of the ordinary Frei's antigen for the specific test. He claims that the serum still has antigenic properties, even at the end of the fourth week of the disease.

Dr. Yushichi Minamizaki, of Tokyo, claims to have shown that hookworms can live in the intestine for a period of seven years, and independently confirm Kendrick's work in Madras.

Doctors Lily Zia and Claude Forkner's paper on acute agranulocytosis in kala-azar will be of special interest to readers in this country. Marked leucopenia is of course a well-recognized condition here, but complete agranulocytosis is a rare finding, and it is quite obvious that it does not occur with anything like the frequency that it does in China. It is accompanied by very severe constitutional symptoms and a fatal issue is common.

Worthy of special mention, and an indication of the importance of the subjects in Eastern countries, is the section on malaria which occupies about one-third of the second volume. Most of the papers in this section

are devoted to work on anti-mosquito measures and entomological studies, but there are four papers in which many of the aspects of modern treatment are discussed.

Of special interest to us in India are two papers by Lieutenant-Colonel Russell. One was on cerebro-spinal meningitis; in this he draws attention to the increase in incidence of this disease in India in the past few years. The other paper is on plague; in this he gives an account of the epidemiology of this disease from 1896 to 1933 in India, and, although plague has accounted for 12,000,000 deaths during this period, the steady decrease in the number of deaths throughout the 38 years is a fine tribute to the work of the public health authorities and sanitarians of this country.

As we have already said, it is a publication that will be of special value to all medical men in the East in whatever line of work they are engaged, but its appeal is far wider than this, and it should be in all the principal medical libraries of the world.

CLINICAL DIAGNOSIS BY LABORATORY METHODS: A WORKING MANUAL OF CLINICAL PATHOLOGY.—By J. Campbell Todd, Ph.B., M.D., and A. Hawley Sanford, A.M., M.D. Eighth Edition. Thoroughly Revised. 1935. W. B. Saunders Company, Philadelphia and London. Pp. 792, with 370 illustrations, 29 in colours. Price, 25s.

The reviewer has been familiar with the earlier editions of this book for a number of years and he has used the seventh edition as a standard book of reference in his laboratory since its publication four years ago; it will now be replaced by the present edition.

The book follows very much the ordinary lines of books on clinical laboratory methods. It begins with a very good discussion on the microscope, its theory and practical use; then follow chapters on sputum and urine examination; the latter is a very comprehensive one, covering well over a hundred pages and including a number of chemical examinations designed to test the functional activity of the kidneys; there is also some useful discussion on the clinical significance of the various findings. Chapter III, on the blood, is also a long one, but the subject has so many aspects that many of the methods have had to be described briefly, and although many alternative methods are given some had to be omitted; this is perhaps an advantage to confuse the reader less. In one of the

of the structures in the most important blood diseases is given. The blood chemistry proper, i.e., tests for the presence of blood, the determination of non-protein nitrogen, blood sugar, etc., are in a separate chapter on clinical chemistry; there is in this chapter a new diagram representing the method by which bile is formed in the liver; this will be a useful diagram for teaching purposes, when, for example, the subject is the significance of the van den Bergh tests. The next two chapters are on the gastric and duodenal contents, and the faeces, respectively. For the histamine test the rather large dose of 0.1 mgm. per 10 kilogrammes of body weight is recommended; severe reactions may follow this dose and a smaller dose will almost always be found sufficient; admittedly this fact is mentioned.

The chapter on animal parasites is very much better than are similar chapters in most books of this kind that are not written solely for the tropical worker.

There are two criticisms that we have to make. The statement made on p. 403 that free hydrochloric acid is *never absent in health* is surely not true; it is in any case contradicted on p. 413 in the statement that achylia may occur in apparently-healthy normal persons.

Certain writers have a deplorable habit of referring to workers in their own country, as originators of some method or theory, whilst ignoring much earlier work in other countries; the habit is not by any means confined to American writers but is perhaps more common amongst them. This mistaken form of

patriotism leaves an impression of either ignorance or dishonesty, and must embarrass their own countrymen, who may have been entirely innocent of any attempt to divert credit to themselves. The rapid typing method for pneumococci which is described as Sabin's (1933) is exactly the method described by Armstrong more than a year earlier. In the paper referred to, Sabin himself gave full credit to the latter worker.

However, on the whole it is a very useful book indeed and one that we can thoroughly recommend both to the clinician and the laboratory worker.

L. E. N.

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY: A COMPLETE DICTIONARY OF THE TERMS USED IN MEDICINE, SURGERY, DENTISTRY, PHARMACY, CHEMISTRY, NURSING, VETERINARY SCIENCE, BIOLOGY, MEDICAL BIOGRAPHY, ETC., WITH THE PRONUNCIATION, DERIVATION AND DEFINITION.—By W. A. Newman Dorland, A.M., M.D., F.A.C.S. Seventeenth Edition, Revised and Enlarged. 1935. W. B. Saunders Company, Limited, London and Philadelphia. Pp. 1573, with 945 illustrations, including 283 portraits. Price, 30s. Plain: 32s. 6d. with Thumb Index. Flexible or Stiff Binding

To review a dictionary is not at any time an easy matter, but when the dictionary has reached its seventeenth edition, and is as well known as is Dorland's, it becomes almost impossible to do more than announce that a new edition has been published.

This dictionary appeared at the beginning of the century and the first edition contained 770 pages; in the present edition there are 1573 pages. The prospect for future generations of medical men is an appalling one, but the importance of the possession of a sound medical dictionary to every medical student, under- or post-graduate, if he is not to be frequently puzzled by words in books and scientific journals, is manifest.

One of the features of this dictionary is the number of thumb-nail illustrations in the text. These are often very helpful. They include so many photographs of eminent medical men of the past that the words 'and biography' might reasonably have been added to the title.

We have kept this dictionary on our table for about a month and have referred to it very frequently, particularly with reference to tropical diseases, and so far we have not found any of the mistakes that often find their way into American medical dictionaries (incidentally all medical dictionaries are American). We did, however, find one mistake; lymphogranuloma inguinale is not the same as ulcerating granuloma of the pudenda, as the dictionary states, though in the next paragraph the former condition is correctly described under the unusual name, lymphogranulomatosis inguinalis.

A large number of posological and other tables are included, either in their appropriate places or at the end of the book, and as well as the text illustrations there are numerous useful full-page plates, some of which are in colour. Altogether it is a dictionary that we can thoroughly recommend.

L. E. N.

FORENSIC CHEMISTRY AND SCIENTIFIC CRIMINAL INVESTIGATION.—By A. Lucas, O.B.E., F.I.C. Third Edition. 1935. Edward Arnold and Company, London. Pp. 376. Price, 18s.

The book is an example of the fact that a large scope is not always inseparable from a large bulk. The 376 pages, including the preface, the introduction and the index, give an excellent insight into the scope of chemistry and scientific methods in general (which '... there is no doubt that the chemist, by reason of his training and experience in manipulation and his skill in testing and in general laboratory practice, is well qualified to understand....') in detecting crime. In view of the diversity of the items discussed (blood-stains; clothing; counterfeit coins; documents; dust,

dirt, glass fragments, stains and marks; explosives and explosions; fibres, woven fabrics, string and rope; finger prints, footprints and tracks of vehicles; fires and insurance frauds; firearms, cartridges and projectiles; microscopy, photography, x-rays, ultra-violet rays and infra-red rays; poisons; preservation of the human body after death; robbery from letters and parcels; and tobacco) a full treatment of items other than documents and firearms, etc., cannot be claimed. The list of references which is full and discriminately selected, however, will put the seeker on the path.

Some descriptions of techniques and findings are rather condensed, yet, speaking strictly, cannot be called obscure. Graphic aids would have made them easier to follow, for instance, tabular ensembles of serological procedures, photomicrographs of haemin crystals and of appearances characteristic of iso-agglutination, photographs (with enlargements) of the faults which characterize counterfeit coins and forged documents, and illustrations of the spectrum with various bands.

It is noted that in the search for blood-stains, while ultra-violet and infra-red rays have been requisitioned, the simple expedient of a candle light in a dark room, for dark fabric, has not been mentioned.

With the introduction most medico-legal workers may not agree. Details concerning record and custody of the exhibits may not 'possibly' appear, but may really be 'trivial and unnecessary'. In India medico-legal workers deal every year satisfactorily with tens of thousands of exhibits from thousands of cases without special attention to the sizes of note books and pencils they use, without sealing locked rooms and cupboards, and without any strain on the imagination. Again, forensic medicine appears to most of us to include chemistry with justification.

The paper, the printing, the binding and the size are good. Only one printer's error on page 101 arrests attention.

The book deserves a place on the desks of medico-legal workers, handwriting experts, censors, lawyers and policemen.

S. D. S. G.

INJURY AND INCAPACITY WITH SPECIAL REFERENCE TO INDUSTRIAL INSURANCE.—By H. E. Griffiths, M.S. (Lond.), F.R.C.S. 1935. Baillière, Tindall and Cox, London. Pp. viii plus 270. Price, 12s. 6d. Obtainable also from Jordan and Sons, Limited, 116, Chancery Lane, W.C. 2, London

THIS book is based on an analysis of 50,000 consecutive cases of accidents in the records of one of the largest English insurance companies dealing mainly with claims arising out of the Workmen's Compensation Acts. If the reader however assumes that he will, on that account, be faced by a mass of tabulated statistics, he will be pleasantly disappointed. Statistics are included, but skilfully whittled down to practical essentials and presented in such form as to be available for easy comparative reference in almost any individual case of incapacity. On a bare and unobtrusive statistical framework the author has succeeded in conveying considerable professional information and while the presentation is normally from the view-point of the compensation acts there is much of value to the ordinary medical man concerned only with diagnosis and prognosis, apart from the question of incapacity in its relation to compensation.

The Workmen's Compensation Act, 1923, has been in force in this country for 12 years. The appearance of this book is timely for while it cannot be said that the 'compensation complex' has yet seriously affected labour in India it is probable that it will not be long before the cost to industry of the Indian Act will be very considerable. The average practitioner, and to a greater degree the official worker, will find it difficult to escape contact with cases coming under the act. To them this book will serve as a valuable source of comparative figures in arriving at an opinion on any

given case. Industrial surgeons working for commercial bodies who have to appear before commissioners under the act as witnesses will do well to be acquainted with it as lawyers will discover in it a sound guide on medical problems with which to confound the unwary.

A special feature is a series of 60 tables. These give to a decimal place the average ascertained periods of incapacity in weeks for workers of different age groups for 60 different type accidents. A peculiar interest attaches to them apart from their intrinsic value. With increasing knowledge of them it is possible that determined malingerers will resist a return to work, whatever their condition, in less than the times given. On the other hand closely supervised and efficient medical organizations should find reasons in them for making every effort to see that their own periods of incapacity do not fall short of those given here without good reason. These are the first published figures from a reliable source which afford a standard for comparison and are therefore of real value to all interested in reducing the cost to industry of the upkeep of its 'wounded'. For obvious reasons the identity of the insurance company has been kept a secret.

The book contains detailed descriptions of 24 physical types of workers setting out minimal physical requirements in each type. An alphabetical list of 1,500 occupations at the end of the book is classified according to these types so that the general assessments in the 50 tables referred to above can be modified to any individual case with very little trouble.

The book is obviously the result of considerable labour and the material has been presented in a clear and original manner. Nothing like it has previously appeared in book form in England and it can be recommended to all those who have to deal with the Compensation Act, whether lawyers or doctors, as well as laymen concerned with the economical employment of labour. The price is reasonable and the volume commendably light and handy.

H. R. R.

THEORY AND PRACTICE OF ANÆSTHESIA.—By M. D. Nosworthy, M.A., M.D., B.Ch. (Cantab.). 1935. Hutchinson and Company (Publishers), Limited, London. Pp. 223, with 35 illustrations. Price, 12s. 6d.

THAT the science of anæsthesia is making a rapid advance is borne out by the fact that a large number of new anæsthetic drugs are being introduced every year. This small treatise on the theory and practice of anæsthesia is the outcome of the vast experience of the author in the field of anæsthesia, not only as anæsthetist to a large hospital but as a teacher. This has enabled the author to study the difficulties of those who are new to the work regarding the induction of various forms of anæsthesia, the complications arising during the induction stage and the management of post-anæsthetic complications.

The author discusses fully the time-honoured chloroform and ether anæsthesia and then deals with all the modern methods of anæsthesia keeping in view all the recent drugs introduced for the purpose. The chapters on shock, pre-medication, regional and spinal anæsthesia deserve special mention. The incorporation of references at the end of chapters is useful.

The book though primarily intended for beginners can be confidently recommended even to the general practitioner for his ready reference in daily practice. It is well printed and contains many useful illustrations.

R. N. C.

OPHTHALMIC NURSING.—By M. H. Whiting, O.B.E., M.A., M.B., B.Ch. (Cantab.), F.R.C.S. Second Edition. 1935. J. and A. Churchill, Limited, London. Pp. xiv plus 191, with 54 illustrations. Price, 5s.

THIS is the second edition of this book which is based on the practices carried out at Moorfields Eye

Hospital, London, on the result of more than a century of experience and tradition.

It consists of fourteen chapters in which are described in a simple and concise manner the anatomy and physiology of the eye, the micro-organisms and their relation to disease, the examination of the eye, diseases of the eye, ophthalmic therapeutics, methods of treatment, operations, nursing of operation and non-operation cases, and eye nursing in schools.

During recent years many important advances have been made in ophthalmology such as the treatment of retinal detachment, orthoptic training in the treatment of squint cases, the use of ultra-violet-light therapy and diathermy. These have necessitated the addition of a new section in the second edition.

In India eye diseases are more prevalent than in other countries and so a knowledge of the nursing of ophthalmic cases is of great importance. Many nurses unfortunately are inadequately trained in ophthalmic nursing and many pass through their course without any at all.

The book is an admirable one and is well illustrated with excellent diagrams. It will be found most valuable not only to nurses but to house surgeons and general practitioners.

We have great pleasure in highly recommending it as a book that should be kept in every hospital in India.

E. O'G. K.

THE ESSENTIALS OF LIGHT TREATMENT.—By K. M. Anderson, M.D., B.S. (Durham). 1935. Haldimore, Tudall and Cox, London. Pp. ix plus 84. Price, 8s.

This small book is written for the use of massenists by a medical practitioner who has lectured to massage students.

The seven chapters in the book are each in the form of a lecture and are remarkably clearly written. According to the title the author sets out to give the essentials of light treatment and she has certainly succeeded. In addition to the massage practitioners for whom it has been written it might profitably be read by medical men in general practice who know nothing of this fairly new and important form of therapy, because in it they will learn the types of cases that can be sent for ultra-violet-ray treatment with prospect of benefit. And still more important is the second-last chapter which is devoted to the contraindications, dangers and overdosage with light rays.

Abstracts from Reports

REPORT ON THE WORKING OF THE PUNJAB MENTAL HOSPITAL, LAHORE, FOR THE YEAR 1934

The total number of patients, i.e., 1,459, treated during 1934 was only a little less than the abnormal number of last year; and again a number of patients had to be refused admission, owing to lack of accommodation. It is hoped that, with the improvement in the financial situation, it will be possible before long to take up again the question of an extension of the hospital buildings. The number of patients discharged as cured was considerably less than in the previous year, viz, 128, as compared with 175. As many as 67 'not improved' cases were discharged, and a considerable number of incurable patients were handed over to their relatives, to facilitate the admission of curable cases.

The health statistics show an improvement even on the eminently satisfactory record of last year, the death rate of 6.19 being again the best on record. Pneumonia, pleurisy and tuberculosis as usual accounted for a considerable proportion of the 68 deaths. A noteworthy feature is the mortality (7) due to ankylostomiasis. The prevalence of this disease, particularly in sub-montane areas, has only been realized in recent years, and an intensive campaign is being waged against it in Gurdaspur district. The chief features of this insidious disease are the gradual deterioration, both physical and mental, of the sufferer, and the difficulty in detection; and the number of deaths from it at the Mental Hospital is significantly illustrative of its nature. The figures for deaths by violence are less disquieting than in recent years, being one death by suicide and one by accident. The staff was recently increased, and further increases are under contemplation; and it is confidently expected that, as a result of this and of special arrangements for exceptionally dangerous patients, there will not be a recrudescence of homicidal cases.

The figures showing the net cost of the institution are necessarily misleading, for various reasons. Thus the net cost in 1933 was only Rs. 43,704, owing to an income of Rs. 2,35,092 as against gross expenditure of Rs. 2,78,796, whereas the net cost for 1934 is Rs. 1,17,298, the recoveries having been only Rs. 1,58,998 as against gross expenditure of Rs. 2,76,296. These variations are due to difficulties in recovering payments from local bodies and other administrations. For example, a sum of Rs. 35,000 on account of military patients has been in dispute for many years with the Military Department, and it is hoped that the amount

encouraged to settle in the smaller towns. Government have been recommended to subsidize twenty doctors, as an experiment, for three years on condition that they settle in selected villages and treat poor people free of cost. This important experiment has been favourably considered by Government, and it is hoped that sanction will be accorded.

It is gratifying to note that there is a continuous increase in the number of patients treated in Government hospitals. The total number of patients treated during the year in all the hospitals and dispensaries, including jail hospitals, was 2,167,612 against 1,864,262 in the previous year showing an increase of 303,350.

The total attendance in all the medical institutions of the Dominions has increased by 66.8 per cent in the past five years. This is not the result of any increase in sickness but is the measure of public confidence gained by medical officers now efficiently supplied with drugs and appliances.

Maternity work.—The number of maternity cases attended to in the various hospitals and dispensaries was 3,341 compared with 2,426 in the year before.

Plague.—As in previous epidemics the spread of infection was entirely due to human migration. This was chiefly effected by:—

1. Introducing actual cases of plague.
2. Introduction of infected bedding and clothing.
3. Entertaining relatives or friends from infected areas.
4. Visiting the sick.

The spread of infection when infection is once brought to a non-infected locality depends on rats. In Hyderabad the rat population, owing to the continuous anti-rat campaign, had been so reduced that the spread of infection was slow. The temperature, the humidity of the air and other factors beyond our control were all favourable for a widespread epidemic of plague, but for this intensive rat destruction throughout the year the plague epidemic would have been more severe, and its spread from locality to locality more rapid.

The spread of plague formerly was much encouraged by concealment of rat-falls and plague cases. Such concealment is now uncommon and the public is co-operating to an increasing extent with the Plague Department. Though no legal action was taken under the recently sanctioned plague rules, yet their very existence helped the department in persuading recalcitrants to follow the right course.

Health camps.—In Hyderabad the Government has spent an enormous amount in providing accommodation for the people during plague epidemics. There are at present 14 permanent camps containing 1,935 sheds and capable of accommodating 16,695 persons. During the fourteenth epidemic besides these permanent camps three temporary camps were opened. The permanent sheds were extended as the occasion demanded and temporary huts were added to permanent camps; 1,486 temporary huts were provided capable of accommodating 4,458 persons.

Malaria.—Returns from different selected hospitals and dispensaries in Hyderabad City show reduction in the malaria attendance from 47 per cent of total attendance before the campaign commenced to 13 per cent during the present year. The steady decrease in the incidence of malaria since the commencement of the antimalarial campaign is marked and is due to anti-larval measures; further improvement may be confidently expected with the closing of wells and improvement in surface drains. Anopheline mosquitoes breeding in the wells, which are not treated or irregularly treated for want of permission, are capable of maintaining the infection in the city in the presence of a large number of people, particularly children, with gametocytes in their blood from former attacks of malaria. It is probable that many cases of malaria seen in the dispensaries are relapses of old infections and not new infections. The splenic index has fallen appreciably during the last four years.

Vaccination.—The total number of vaccinations performed during the year was 205,916 compared with 173,960 the previous year.

The cost of vaccinations which was met by the Local Fund Department and the Hyderabad Municipality aggregated Rs. 61,252-9-0 against Rs. 56,199-9-3 last year. The average cost of each successful vaccination was five annas one pie against five annas eleven pies in the preceding year.

Infant welfare centres.—A second infant welfare centre was opened during the year. The Hyderabad Municipality sanctioned funds for this centre in addition to the Darulshafa centre in the city area, both under the control of the Director of the Medical Department. The Director is assisted by a ladies committee consisting of a president and six members including a secretary.

The activities of the two Hyderabad centres during the year of report were briefly as follows:—

The infant welfare centre work falls into three classes:—

- (1) Before the child is born ante-natal work to prevent complications.
- (2) The provisions of reasonably skilled and clean attendance at the time of childbirth and afterwards so that infection may be prevented.
- (3) Assisting the mother in rearing children in a healthy way and preventing the onset of disease.
- (4) Domiciliary visits to the new-born.
- (5) Training and registering of dais.

It is impossible to abstract fully this voluminous report which, including tables, covers 318 pages. The few salient features we have chosen will show, however, that public health in Hyderabad State is receiving much attention and that education of the public is proceeding along with the extension of health regulations with very satisfactory results.]

ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER, CITY OF BOMBAY, FOR THE YEAR 1934

Despite a small increase in the total mortality, the health conditions of the city during the year under report were satisfactory. There was no epidemic during the year. The number of live births registered during the year was more by 6,351 than the number of deaths that took place in the city. This excess of births over deaths was equivalent to 5.4 per 1,000 population calculated on the census of 1931. Before 1931 there was no such excess since 1866, the year in which birth records were instituted.

The number of live births registered was 33,724 being 2,798 more than in 1933, 9,275 more than the average of the last ten years 1924 to 1933 and the highest on record since 1866. The birth rate calculated on the census population of 1931 was 29.0 births per 1,000.

The total number of deaths from all causes was 27,370 being 196 more than in 1933, 1,522 more than the average for the last five years (1929 to 1933) and 1,322 less than that for the preceding decennium (1924 to 1933). The death rate or the number of deaths in the year per 1,000 of the census population of 1931 was 23.6 as against 23.4 in 1933 and 23.0 the rate recorded for the decennium 1924 to 1933.

Plague was reported as the cause of 31 deaths during the year as against 48 in 1933 and 127 the average of the last ten years 1924 to 1933.

Smallpox caused 152 deaths as against 2,659 in 1933 and 955, the average for the last decennium 1924 to 1933.

Cholera was registered as the cause of 13 deaths being 4 less than in 1933 and 19 less than the average for the ten years 1924 to 1933.

Influenza was prevalent in a mild form in the city during the year and caused 98 deaths as against 76 in the preceding year and 68 the average for the last decennium 1924 to 1933.

The deaths from diseases of the respiratory system numbered 10,056 being 954 more than in 1933 and 405 less than the average of the last ten years 1924 to 1933.

Tuberculosis accounted for 1,856 deaths as against 1,594 in 1933 and 1,576 the average for the preceding decennium 1924 to 1933.

One hundred and one deaths were due to malaria, being 30 more than in 1933 and 201 less than the average of the last decennium (1924 to 1933). There were 1,397 deaths from ague and remittent fever as against 1,192 in 1933. The average number of deaths for the last ten years (1924 to 1933) from malaria was 305 and from ague and remittent fever 1,697.

The deaths among infants under one year of age numbered 8,253 against 8,320 in 1933 and 7,564 the average for the last ten years (1924 to 1933). The rate of infant deaths per 1,000 births registered was 245.

Compared with the decennial averages (1924 to 1933) the total number of deaths shows a decrease of 1,322, the principal decrease in the mortality being 19 deaths under cholera, 96 under plague, 803 under smallpox, 204 under malaria, 300 under ague and remittent fever, 836 under diarrhoea, enteritis and dysentery and 405 under diseases of the respiratory system. On the other hand there was an increase of 46 deaths under measles, 30 under influenza, 68 under enteric fever, and 280 under tuberculosis.

[The above summary shows that the acute infectious diseases are being successfully controlled and to some extent overcome, but the increase in deaths from tuberculosis should be a matter of great concern to the municipal authorities.]

ANNUAL REPORT OF THE MALARIA ADVISORY BOARD, FEDERATED MALAY STATES, KUALA LUMPUR, FOR THE YEAR 1934. By A. NEAVE KINGSBURY, CHAIRMAN

THIS report does not lead itself to abstraction nor are the records of the work of this board likely to interest the majority of our readers, nevertheless it is of value as a demonstration of the importance of co-operation between all sections of a community in attacking the many problems of malaria control. It should be read in the original by all malaria control officers.

Correspondence

INTRA-UTERINE MALARIAL INFECTION

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—With reference to our report on the use of atebirin in malaria sent to you for publication in the *Indian Medical Gazette*, we would like to report an interesting case recently treated, details of which we annex below.

A lady in an out-station in her seventh month of pregnancy had several attacks of malaria and was treated by the local doctor. She had about eighteen attacks of fever and in desperation was brought to this town for treatment by us with atebirin, as nothing seemed to do her good. She was promptly given two injections of atebirin dihydrochloride on two successive days. She had no fever after the second injection, but was given oral treatment of two atebirin tablets daily for five days. She remained free of fever even during her puerperium, which took place at term.

The child was a weakling and weighed five pounds at birth. When the infant was twelve days old she developed a temperature which recurred on the thirteenth and fourteenth days. One of us was then sent for and took a blood film in which we found a heavy malarial infection—mixed benign and malignant tertian; benign tertian gametocytes were present. While the film was being examined a message was

received that the child was sinking and that it would not be necessary for the doctor to go back to give the child an injection. On arrival there we found the child in a very low condition with bluish lips, and more or less unconscious and unable to swallow. The pulse was feeble and very rapid. After stimulation with camphor and ether, an injection of atebirin dihydrochloride—half tablet—was given. The next morning the child seemed much better, was taking the breast and was more lively. A second injection of the same strength was given and the temperature dropped to below normal and the improvement was maintained. This was followed by per-oral treatment with atebirin and quinine powders, and to-day the child is putting on weight and gaining strength, and is quite lively. The infection in this case must have been through the maternal blood, while the child was *in utero*.

Yours, etc.,

A. E. SPAAR, F.R.C.S.E.

KANDY,
15th October, 1935.

EPIDEMIC DROPSY

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I shall be very much obliged if you will kindly enlighten me on the following points. The September issue of the *Indian Medical Gazette* contains a number of articles on 'Epidemic Dropsy'—the burning question of the day—even in the remotest villages.

The treatment indicated is tincture ephedra vulgaris for the heart, which is analogous to the action of adrenalin and so will accelerate the heart. What should be done in the following case of epidemic dropsy?

- (1) Patient, aged 7 years; history of beri-beri—three months.
- (2) Sudden dilatation of the heart—apex beat diffuse and 1 inch lateral to the nipple line.
- (3) Pulse 170 and respiration 70 per minute.
- (4) Haemoglobin—45 per cent. The patient suffering extremely from dyspnoea—apparently cardiac in origin.
- (5) Temperature—101°F.

Questions

- (1) Whether tincture ephedra should be given or not—if so in what dose?
- (2) Whether digitalin, cardiazol, adrenalin (accelerator) should be given in such cases?
- (3) What about giving 'coramine'?
- (4) If digitalin, digifortis, digistan (B. C. P. W.) produce no action, what is to be done?
- (5) Whether blood letting should be done in anæmic cases like this?
- (6) Is Vitys (B. C. P. W.) to be given?

I shall be very much obliged if you will kindly give me detailed advice on these points.

Yours, etc.,

S. P. ROY CHAUDHURY, M.B. (Cal.).

PALANG,
24th September, 1935.

[Note.—Sudden dilatation of the heart after an attack of epidemic dropsy for three months is obviously a grave condition. Such an advanced case with organic cardiac changes should be treated as one of acute cardiac failure. Blood letting should be done when there are indications of great distension of the right chambers of the heart—as, for example, severe dyspnoea, cyanosis, engorgement of the veins of the neck and weak pulse. If venesection be not possible, application of leeches in the liver region is a good substitute. With a pulse rate of 170 it is advisable to give strophanthin gr. 1/500 intravenously followed by oral administration of digitalis or pandigital, although they are not so effective in these cases as in acute failure due to mitral valvular disease, e.g., auricular fibrillation. Cardiazol or camphor in ether and glucose are given also. Coramine can be tried, but it is more useful in cardio-respiratory

failure due to anaesthesia or poisoning. If the blood pressure be low—tincture ephedra (up v to m x, t.d.s., in a boy of 7 years) will help the process of circulation by counteracting the dilatation of capillaries that occurs even in the heart of epidemic dropsy cases.—*Enron, I. M. G.J*

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL R. N. CHOPRA, C.I.E., Professor of Pharmacology and Officiating Director, School of Tropical Medicine, Calcutta, is appointed to officiate as Surgeon-General with the Government of Bengal, with effect from the 13th September, 1935, *vice* Major-General D. P. Goil, granted leave.

Lieutenant-Colonel J. Rodger, M.C., Civil Surgeon, Sibi and Loralai, is appointed to officiate as Residency Surgeon and Chief Medical Officer in Baluchistan, in addition to his own duties, with effect from the forenoon of the 14th September, 1935, and until further orders.

The services of Lieutenant-Colonel F. A. Barker, O.B.E., Officer on special duty in the Home Department, are replaced at the disposal of the Government of the Punjab, with effect from the 16th September, 1935.

Lieutenant-Colonel T. C. Boyd, on return from leave, is reappointed as Principal, Medical College, and Superintendent, Medical College Hospitals, Calcutta.

Lieutenant-Colonel B. H. Singh, Officiating Principal, Medical College, and Superintendent, Medical College Hospitals, Calcutta, on relief, is posted to Burdwan as Civil Surgeon, *vice* Rai Dr. J. N. Chatterji Bahadur.

Lieutenant-Colonel T. J. Anderson, on return from leave, is reappointed as Professor of Clinical Surgery, Medical College, Calcutta.

Lieutenant-Colonel P. F. Gow, on return from leave, is reappointed as Professor of Midwifery, Medical College, Calcutta.

Major A. D. Loganadan is appointed as Officer on special duty in the office of the Public Health Commissioner with the Government of India, with effect from the 9th September, 1935.

Major J. C. Drummond, Officiating Professor of Clinical Surgery, Medical College, Calcutta, on relief, is appointed as Civil Surgeon, Hooghly, *vice* Lieutenant-Colonel C. A. Godson.

Captain C. L. Parichha, who was provisionally appointed Professor of Pathology and Bacteriology, School of Tropical Medicine, Calcutta, is confirmed in the appointment, with effect from 15th July, 1933.

Captain A. M. Sheridan is confirmed in civil employment under the Government of India, Department of Education, Health and Lands, with effect from the 1st September, 1935.

The probationary appointment of the undermentioned officer is confirmed:—

Captain G. P. Charlewood. Dated 28th September, 1935.

Captain F. H. A. L. Davidson made over executive charge of the Rajshahi Central Jail to Mr. Chas. A. W. Luke on the forenoon of the 1st October, 1935.

The services of Captain H. S. Waters are placed at the disposal of the Chief Commissioner, Delhi, for appointment as Civil Surgeon, New Delhi, with effect from the 16th October, 1935.

TEMPORARY COMMISSIONS

To be Lieutenants

Bashier Hussain Sayed. Dated 17th June, 1935.

V. Sivasankaran. Dated 22nd June, 1935.

Jagdish Ram Vaid. Dated 24th June, 1935.

Kamarasu Narasimha Rao. Dated 1st July, 1935.

Bhagwan Singh Khurana. Dated 1st July, 1935.

PROMOTIONS

Colonel to be Major-General

E. W. C. Bradfield, C.I.E., O.B.E., V.H.S. Dated 14th August, 1935.

Lieutenant-Colonel to be Colonel

N. S. Sodhi, M.C. Dated 12th August, 1935.

Majors to be Lieutenant-Colonels

S. Nag. Dated 10th September, 1935.

J. Rodger, M.C. Dated 18th September, 1935.

G. B. Hanna. Dated 30th September, 1935.

RETIREMENTS

Major-General Sir R. McCarrison, Kt., C.I.E., K.H.F. Dated 19th August, 1935.

Major-General H. R. Nutt, K.H.S. Dated 14th August, 1935.

Colonel A. H. Proctor, D.S.O. Dated 21st August, 1935.

RELINQUISHMENTS

Temporary Commissions

Dated 31st August, 1935

Captain A. M. Khan.

Captain P. P. Chowdry.

Dated 1st September, 1935

Captain H. K. Handoo.

Captain P. N. Sathe.

Dated 5th September, 1935

Captain D. N. Basu.

Dated 8th September, 1935

Captain H. S. Ahluwalia.

RESIGNATION

Captain J. M. Mathew resigns his commission, 5th September, 1935.

Notes

INTRATRACHEAL INSUFFLATION APPARATUS

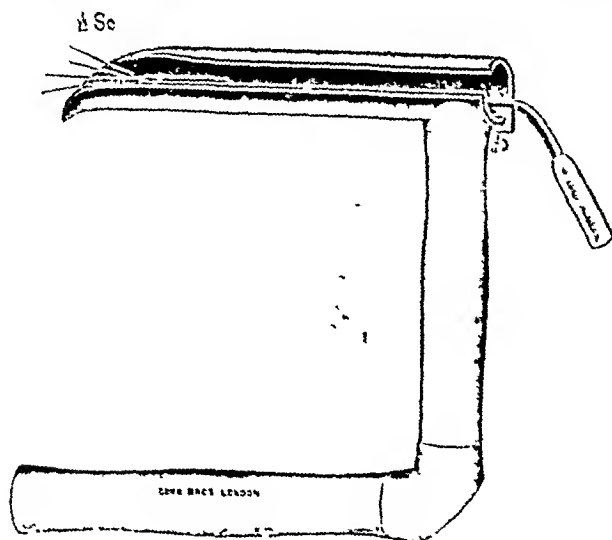
Messrs. Down Brothers of London have made for us the apparatus necessary for intratracheal insufflation of an oxygen-carbon-dioxide mixture in the treatment of asphyxia neonatorum, as described in the *Lancet* of 30th March, 1935.

The direct vision pharyngoscope illustrated is a modification of Howarth's Chevalier Jackson's instrument which has been designed for use in the new-born infant. The speculum is 10 cm. long and its greatest outside diameter is 1.6 cm. The spatula is very short so that the soft palate does not obstruct the line of vision. The handle of the instrument is parallel to the speculum and joined to it by a shank 11 cm. long. This parallel handle gives better control than one set at a right angle to the speculum, and a shank of this length gives sufficient clearance between the handle and the chest wall during use. A wide infra-lateral slot runs the entire length of the speculum so that the pharyngoscope can easily be withdrawn without displacing the catheter when the latter has been introduced into the trachea. The illumination is by a lamp situated at the distal end, and the current is supplied by a battery enclosed in a separate wooden box with a variable resistance. In practice this arrangement of having a large separate battery has been found to be very satisfactory, since a dry-cell purchased eighteen months ago is still in use.

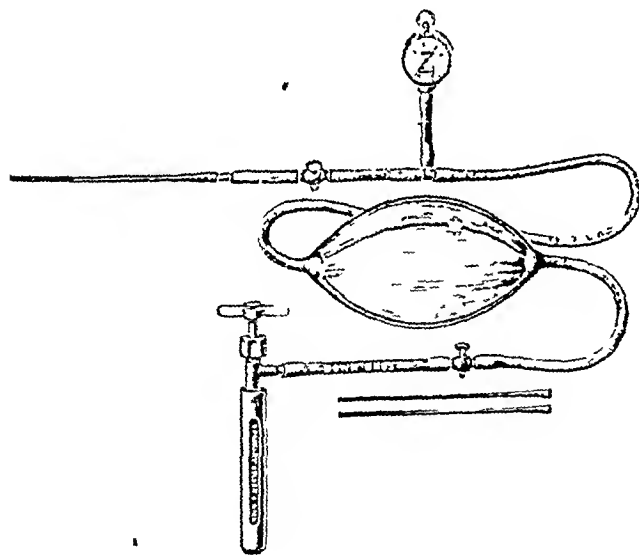
The catheter used is a Magill's silk-web endo-tracheal catheter with a funnel-shaped end. Sizes 3, 4 and 5 give a suitable range. The choice between these sizes is determined by the size of the infant.

The apparatus for delivering the oxygen-carbon-dioxide mixture (90 to 95 per cent oxygen and 5 to 10 per cent carbon dioxide) consists of a rubber bag of 3,000 c.c. capacity, fitted at one pole with an inlet tube

which can be connected to the supply of gas, and through which the bag can be filled. A tap on the inlet tube allows the bag to be disconnected from the supply of gas, if necessary, so that it can be kept in readiness



in a convenient place, after having been filled. At the opposite pole of the bag is the outlet tube also furnished with a tap. This rubber tube is about 2 feet long and terminates in a conical glass connection which is easily connected to the funnel-shaped end of the endo-tracheal catheter after the latter has been introduced through the direct vision pharyngoscope. By means of a metal T-piece, an aneroid manometer is attached to the outlet tube near its exit from the bag. This manometer has been specially made to register pressures within a range from 0 to 50 cm. of water.



The whole apparatus is compact and can be easily carried in the midwifery bag. By compressing the bag with the hand the gas can be forced through the endo-tracheal catheter at any desired pressure, and any variations in pressure are immediately recorded on the manometer. The pressure required in the bag is usually 30 to 35 cm. of water, and this is sufficient to produce a pressure of about 10 cm. of water in the lungs themselves, provided a suitable size of catheter is chosen depending upon the size of the infant. If necessary the bag can be continually refilled without interrupting the process of sufflation.

T. C. P. ANTISEPTIC

SAMPLES of T. C. P. (Trichlorophenylmethyl-iodo-licyl) were sent to the Clinical Research Association

Limited, London, for testing; an extract from the report is given below:—

Test for the determination of bactericidal action of T. C. P. in the presence of blood serum

In T. C. P. to which 20 per cent blood serum has been added the *Staphylococcus aureus* was killed in 30 seconds.

Similar results were obtained with the undiluted T. C. P. solution.

Test to determine penetration power of T. C. P.

Staphylococcus aureus was again used, the control plate being submitted to 1 per cent phenol solution as against a 1 per cent solution of T. C. P. The following results were obtained:—

1 per cent phenol solution—practically no penetration.

1 per cent T. C. P. solution—marked penetration ring.

Test to determine non-destruction of tissue cells by T. C. P.

Pus leucocytes were submitted to the action of T. C. P. for a period of 5 minutes. They were then washed and examined, stained and unstained. Controls with leucocytes from the same specimens were similarly examined.

In comparing the treated and untreated leucocytes it is noted that no injury to the unstained cell structure is apparent.

In the stained films the treated cells, in some instances, showed slight shrinkage, and the differentiation between nucleus and protoplasm was not quite so clear cut, but, in view of the observation on unstained specimens, this cannot be regarded as definite evidence of injury to the cell tissue, as it may be something in the nature of an altered staining reaction.

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